NetSure 501 A50, NetSure 501 AA0, NetSure 701 A51
19-Inch Subrack Power Supply System
User Manual

Version	V1.0
Revision date	June 13, 2008
BOM	31011680

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Safety Precautions

To reduce the chance of accident, please read the safety precautions very carefully before operation. The "Caution, Notice, Warning, Danger" in this book do not represent all the safety points to be observed, and are only supplement to various safety points. Therefore, the installation and operation personnel must be strictly trained and master the correct operations and all the safety points before actual operation.

When operating Emerson products, the safety rules in the industry, the general safety points and special safety instructions specified in this book must be strictly observed.

Electrical Safety

I. Hazardous voltage

Danger

Some components of the power system carry hazardous voltage in operation. Direct contact or indirect contact through moist objects with these components will result in fatal injury.

Safety rules in the industry must be observed when installing the power system. The installation personnel must be licensed to operate high voltage and AC power.

In operation, the installation personnel are not allowed to wear conductive objects such as watches, bracelets, bangles, rings.

When water or moisture is found on the Subrack, turn off the power immediately. In moist environment, precautions must be taken to keep moisture out of the power system.

"Prohibit" warning label must be attached to the switches and buttons that are not permitted to operate during installation.

Danger

High voltage operation may cause fire and electric shock. The connection and wiring of AC cables must be in compliance with the local rules and regulations. Only those who are licensed to operate high voltage and AC power can perform high voltage operations.

II. Tools

Warning

In high voltage and AC operation, special tools must be used. No common or self-carried tools should be used.

III. Thunderstorm

Danger

Never operate on high voltage, AC, iron tower or mast in the thunderstorm.

In thunderstorms, a strong electromagnetic field will be generated in the air. Therefore the equipment should be well earthed in time to avoid damage by lightning strikes.

IV. ESD

Notice

The static electricity generated by the human body will damage the static sensitive elements on PCBs, such as large-scale ICs. Before touching any plug-in board, PCB or IC chip, ESD wrist strap must be worn to prevent body static from damaging the sensitive components. The other end of the ESD wrist strap must be well earthed.

V. Short circuit

Danger

During operation, never short the positive and negative poles of the DC distribution unit of the system or the non-grounding pole and the earth. The power system is a constant voltage DC power equipment, short circuit will result in equipment burning and endanger human safety.

Check carefully the polarity of the cable and connection terminal when performing DC live operations.

As the operation space in the DC distribution unit is very tight, please carefully select the operation space.

Never wear a watch, bracelet, bangle, ring, or other conductive objects during operation.

Insulated tools must be used.

In live operation, keep the arm muscle tense, so that when tool connection is loosened, the free movement of the human body and tool is reduced to a minimum.

Battery

Danger

Before any operation on battery, read carefully the safety precautions for battery transportation and the correct battery connection method.

Non-standard operation on the battery will cause danger. In operation, precautions should be taken to prevent battery short circuit and overflow of electrolyte. The overflow of electrolyte will erode the metal objects and PCBs, thus causing equipment damage and short circuit of PCBs.

Before any operation on battery, pay attention to the following points:

Remove the watch, bracelet, bangle, ring, and other metal objects on the wrist.

Use special insulated tools.

Use eye protection device, and take preventive measures.

Wear rubber gloves and apron to guard against electrolyte overflow.

In battery transportation, the electrode of the battery should always be kept facing upward. Never put the battery upside down or slanted.

BLVD

The system has battery low voltage disconnection (BLVD) function. BLVD means when the mains fail and batteries supply power, the monitoring module cuts the load off when the battery voltage drops down to below 43.2V to prevent over-discharge. The BLVD voltage is settable. Refer to *4.7.2 Battery Selection, 5.3.6 Settings,* or *6.7.3* Battery Settings for setting method.

The factory setting is enabling BLVD, which means that if power outage lasts for a long time or the power supply system fails, there might be BLVD. Users should classify the loads and connect the priority loads to BLVD routes. For vital loads, users can disable BLVD of these loads to insure reliability of the power supply.

The method of disabling BLVD is:

Set “BLVD Enable” item of the monitoring module to “N”. Refer to *4.7.3 LVD Parameter Description*, *5.5.2 Battery Management Parameters* or *6.7.3 Battery Settings* for setting method.

Notice

The advantage of enabling BLVD is protecting the batteries from over-discharge when the battery voltage is low. The disadvantage of enabling BLVD is that when the battery voltage drops down to a certain value, all the loads (including non-priority loads and priority loads) will be cut off due to battery disconnection.

The advantage of software disabling BLVD is prolonging the power supply of priority loads. The disadvantage is that software disabling cannot prevent unwanted power failure due to misoperation or power supply system failure.

Others

I. Sharp object

Warning

When moving equipment by hand, protective gloves should be worn to avoid injury by sharp object.

II. Cable connection

Notice

Please verify the compliance of the cable and cable label with the actual installation prior to cable connection.

III. Binding the signal lines

Notice

The signal lines should be bound separately from heavy current and high voltage lines, with binding interval of at least 150mm.

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Chapter 1 Overview

This chapter introduces model description, composition and configuration, and features.

The “system” in this manual refers to the PS48150-3B/1800 (NetSure 501 A50) (abbreviated as “NetSure 501 A50”), PS48300-3C/1800 (NetSure 501 AA0) (abbreviated as “NetSure 501 AA0”) and PS48300-3A/3200 (NetSure 701 A51) & PS48300-3A/3200-X2 (NetSure 701 A51) (abbreviated as “NetSure 701 A51”) power supply system.

1.1 Model Information

Take PS48150-3B/1800 (NetSure 501 A50) power supply system as an example, the model description is given in Figure 1-1 and Figure 1-2.

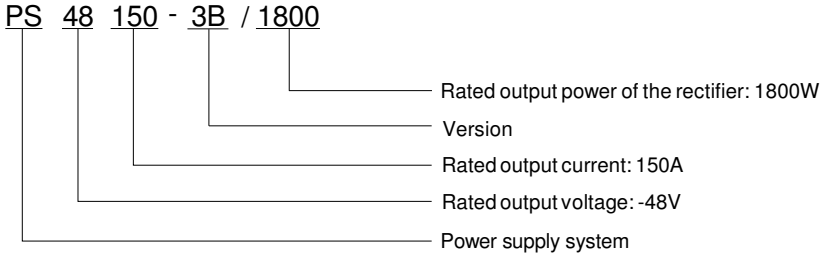

PS 48 150 - 3B / 1800
Rated output power of the rectifier: 1800W
Version
Rated output current: 150A
Rated output voltage: -48V
Power supply system

Figure 1-1 Model information (1)

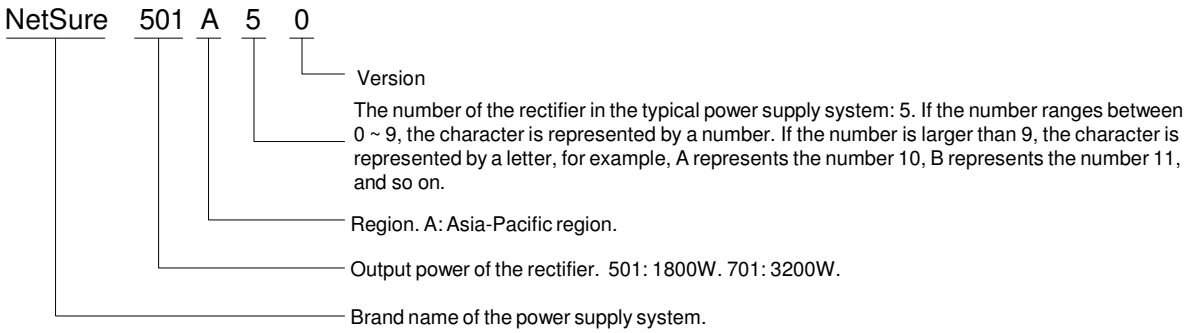

NetSure 501 A 5 0
Version
The number of the rectifier in the typical power supply system: 5. If the number ranges between 0 ~ 9, the character is represented by a number. If the number is larger than 9, the character is represented by a letter, for example, A represents the number 10, B represents the number 11, and so on.
Region. A: Asia-Pacific region.
Output power of the rectifier. 501: 1800W. 701: 3200W.
Brand name of the power supply system.

Figure 1-2 Model information (2)

1.2 Composition And Configuration

System composition

The system consists of power distribution parts, rectifiers and monitoring module. The rectifier model is R48-1800, R48-2900U or R48-3200 and the model of the monitoring module is M501D or M500D. The internal structures of the systems are shown in Figure 1-3 to Figure 1-6.

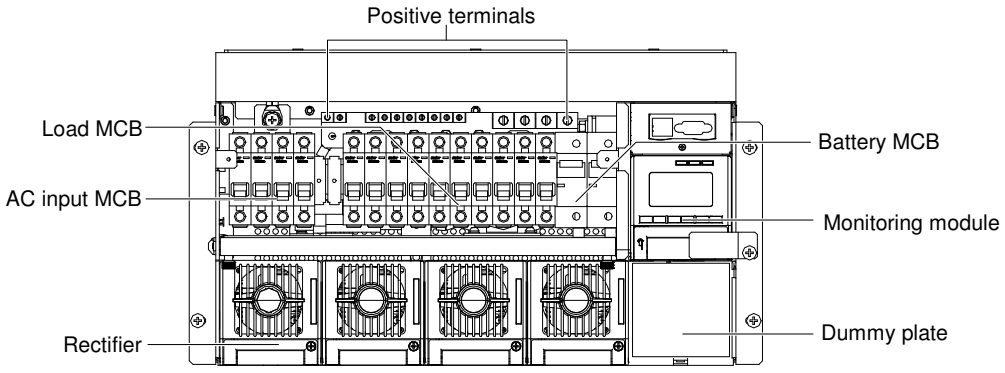


Figure 1-3 NetSure 501 A50 system structure

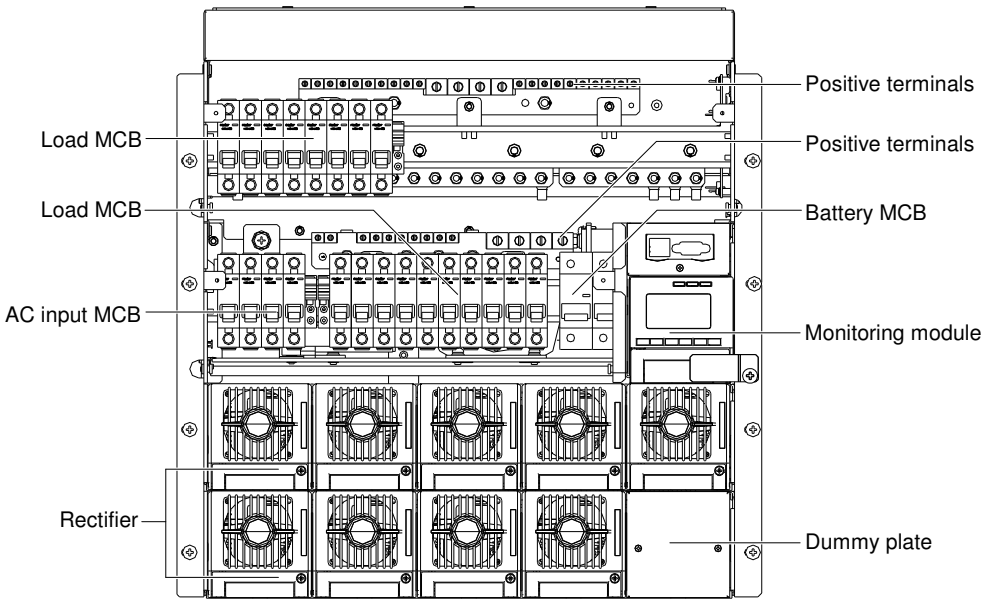


Figure 1-4 NetSure 501 AA0 system structure

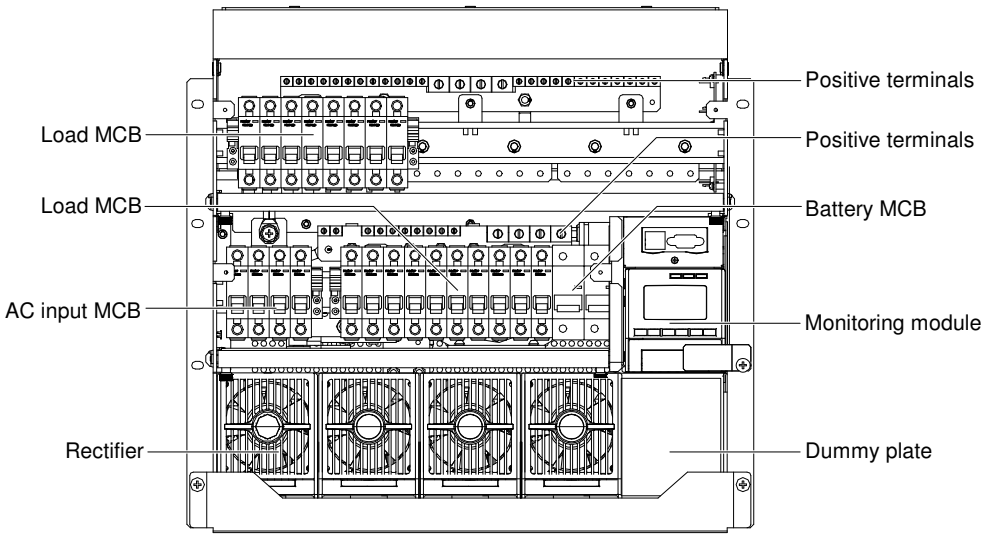


Figure 1-5 NetSure 701 A51 (PS48300-3A/3200) system structure

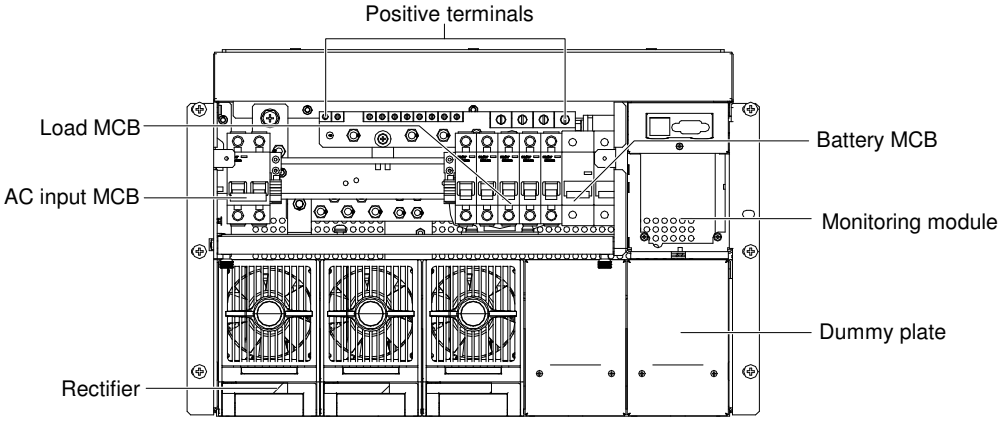


Figure 1-6 NetSure 701 A51 (PS48300-3A/3200-X2) system structure

System configuration

The configurations of the power supply system are described in Table 1-1.

Table 1-1 Configuration of fixed- configuration system

Item	NetSure 501 A50	NetSure 501 AA0	NetSure 701 A51 (PS48300-3A/3200)	NetSure 701 A51 (PS48300-3A/3200-X2)
Monitoring module	Model: M501D	Model: M501D	Model: M501D	Model: M500D
Rectifier	Model: R48-1800. Standard configuration: 5 pieces	Model: R48-1800. Standard configuration: 10 pieces	Model: R48-3200. Standard configuration: 5 pieces	Model: R48-2900U. Standard configuration: 3 pieces
AC power distribution	3P + N + PE/ 380Vac	3P + N + PE/ 380Vac	3P + N + PE/ 380Vac	P + N + PE/ 230Vac
DC power distribution	BLVD load route: 3 × 63A/1P, 3 × 32A/1P, 4 × 10A/1P MCB No LLVD load route	BLVD load route: 5 × 63A/1P, 5 × 32A/1P, 8 × 10A/1P MCB No LLVD load route	BLVD load route: 5 × 63A/1P, 5 × 32A/1P, 8 × 10A/1P MCB No LLVD load route	BLVD load route: 4 × 40A/1P, 1 × 10A/1P MCB No LLVD load route
Battery MCB	2 × 125A/1P	2 × 125A/1P	2 × 125A/1P	2 × 125A/1P
Maximum dimensions	483 (W) × 380 (D) × 267 (H)	483 (W) × 380 (D) × 490 (H)	483 (W) × 380 (D) × 445 (H)	483 (W) × 380 (D) × 311 (H)
Weight	25kg (not including rectifiers and monitoring module)	30kg (not including rectifiers and monitoring module)	25kg (not including rectifiers and monitoring module)	25kg (not including rectifiers and monitoring module)
Optional parts	Temperature sensor and connected cables, remote monitoring unit, battery rack			

1.3 Features

- The rectifier uses the active Power Factor Compensation (PFC) technology, raising the power factor to 0.99
- Wide AC input voltage range: 85V ~ 290V (NetSure 701 A51) or 85Vac ~ 300Vac (NetSure 501 A50 & NetSure 501 AA0)
- The rectifier uses soft switching technology, raising the system efficiency to 89% (R48-1800)/ 90% (R48-3200)
- Ultra-low radiation. With advanced EMC design, the rectifier meets international standards such as CE and NEBS. Both the conducted and radiated interference reach Class B
- The rectifier safety design complies with UL, CE and NEBS standards
- High power density
- Rectifiers are hot pluggable. It takes less than 1min to replace a rectifier
- Two over-voltage protection methods are optional: hardware protection and software protection. The latter one also has two optional modes: lock-out at the first over-voltage and lock-out at the second over-voltage
- Perfect battery management: The management functions include the LLVD (optional), BLVD, temperature compensation, auto voltage regulation, stepless current limiting, battery capacity calculation and on-line battery test, etc
- Up to 200 pieces of historical alarm records, and 10 sets of battery test data records
- Network design: Providing multiple communication ports (such as RS232, modem, RJ45 and dry contacts), which enables flexible networking and remote monitoring
- Perfect lightning protection at AC side
- Complete fault protection and fault alarm functions

Chapter 2 Installation Instruction

This chapter introduces installation and cable connection. Before installation, please read through safety regulations, and then follow this instruction to carry out the installation step by step.

2.1 Safety Regulations

Certain components in this power system have hazardous voltage and current. Always follow the instructions below:

1. Only the adequately trained personnel with satisfactory knowledge of the power system can carry out the installation. The most recent revision of these safety rules and local safety rules in force shall be adhered to during the installation.

2. All external circuits that are below 48V and connected to the power system must comply with the requirements of SELV as defined in IEC 60950.

3. Make sure that the power (mains and battery) to the system is cut off before any operations can be carried out within the system subrack.

4. The power subracks shall be kept locked and placed in a locked room. The key keeper should be the one responsible for the power system.

5. The wiring of the power distribution cables should be arranged carefully so that the cables are kept away from the maintenance personnel.

2.2 Preparation

Unpacking inspection

The equipment should be unpacked and inspected after it arrives at the installation site. The inspection shall be done by representatives of both the user and Emerson Network Power Co., Ltd.

To inspect the equipment, you should:

1. Open the packing case in which the packing list is put.

2. Take out the packing list.

3. Check against the packing label, including customer name, customer address, machine No., total amount, case No., contract No.

Unpacking and inspection: After opening the packing case, check the goods one by one according to the goods list on the packing label. The checking should include:

1. The number of the packing cases and the serial number marked on them.

2. The correctness of the equipment packing according to the packing list.

3. The number and model of the accessories according to the accessory list.

4. The completeness of the equipment set according to the system configuration.

5. The condition of the goods through visual inspection. For example, check the subrack for any damage and condensation. Shake the rectifier module gently to see if any component or connection has loosened during transportation.

Cables

The cable design should meet relevant industry standards.

It is recommended to use the RVVZ cables as AC cables. The cable should reach at least +70℃ temperature durability. With cable length shorter than 30 meters, the Cross-Sectional Area (CSA) calculation should be based on the current density of 2.5A/mm^2. The suggested CSA value is no less than 25mm^2.

The CSA of DC cable depends on the current flowing through the cable and the allowable voltage drop. To select the battery cable CSA, see Table 2-1. Select the DC load cable CSA according to the Table 2-2:

Table 2-1 Battery cable CSA selection

Battery MCB rated current	Max. battery current	Min. cable CSA	Max. cable length (allowable voltage drop: 0.5V)
125A	100A	25mm^2	14m
Note: 1. The specs are applicable at ambient temperature of 25℃. If the temperature is higher or lower than this, the CSA of the cable should be increased. 2. The battery cable should reach at least +90℃ heat durability. It is recommended to use double-insulated copper-core flame retardant cable as battery cable			

Table 2-2 DC load cable selection

Load route rated current	Max. output current	Min. cable CSA	Max. cable length (volt drop: 0.5V, with min. CSA)	Max. cable CSA	Max. cable length (volt drop: 0.5V, with max. CSA)
63A	32A	16mm^2	7m	25mm^2	11m
32A	16A	16mm^2	14m	25mm^2	22m
10A	5A	6mm^2	17m	25mm^2	71m
Note: The specs are applicable at ambient temperature of 25℃. If the temperature is higher or lower than this, the CSA of the cable should be increased					

The MCB capacity should be strictly limited so that it can function properly upon load over-current. The recommended MCB capacity is 1.5 ~ 2 times larger than the load peak capacity.

The CSA of the system earth cable should be consistent with that of the maximum power distribution cable and no less than 35mm^2.

2.3 Mechanical Installation

For the convenience of maintenance, users should maintain a clearance of 800mm at the front of the power supply system.

Insert the power supply system into the cabinet. Install the screws in the four installation holes as shown in Figure 2-1 to Figure 2-4 with a Phillips screwdriver.

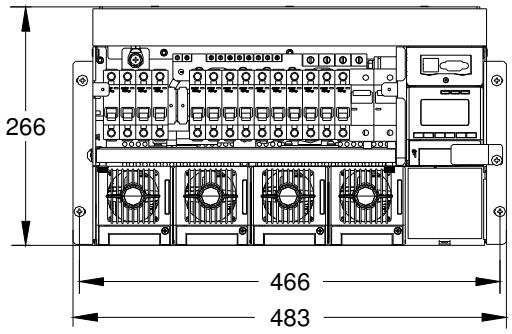


Figure 2-1 Installation size of NetSure 501 A50 (unit: mm)

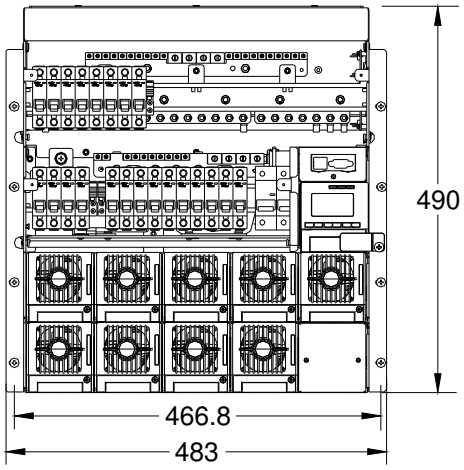


Figure 2-2 Installation size of NetSure 501 AA0 (unit: mm)

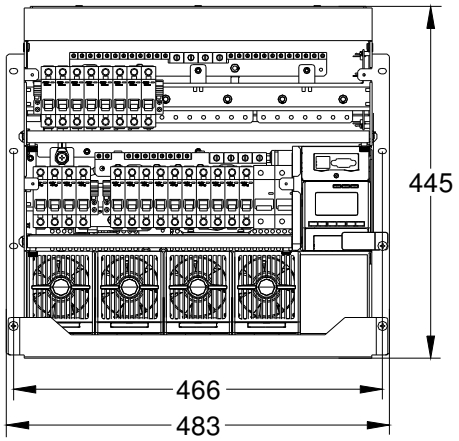


Figure 2-3 Installation size of NetSure 701 A51 (PS48300-3A/3200) (unit: mm)

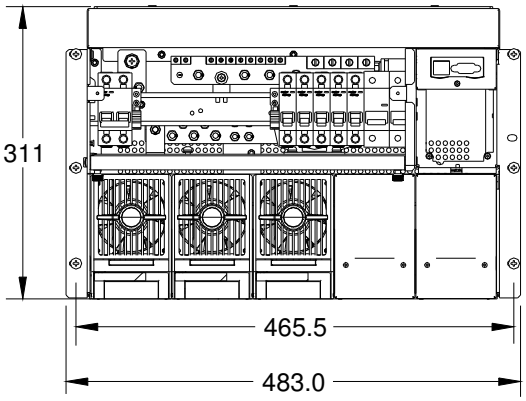


Figure 2-4 Installation size of NetSure 701 A51 (PS48300-3A/3200-X2) (unit: mm)

2.4 Electrical Installation

2.4.1 Connecting Power Cables

Connecting AC input cables

Danger

1. Switch off all MCBs before the electrical connection.

2. Only the qualified personnel can do the mains cable connection.

Feed all the cables into the subrack from top of the subrack. Take the NetSure 701 A51 power supply system as an example, the position of the connection terminals are shown in Figure 2-5. Connect the AC input cables to the AC input MCB.

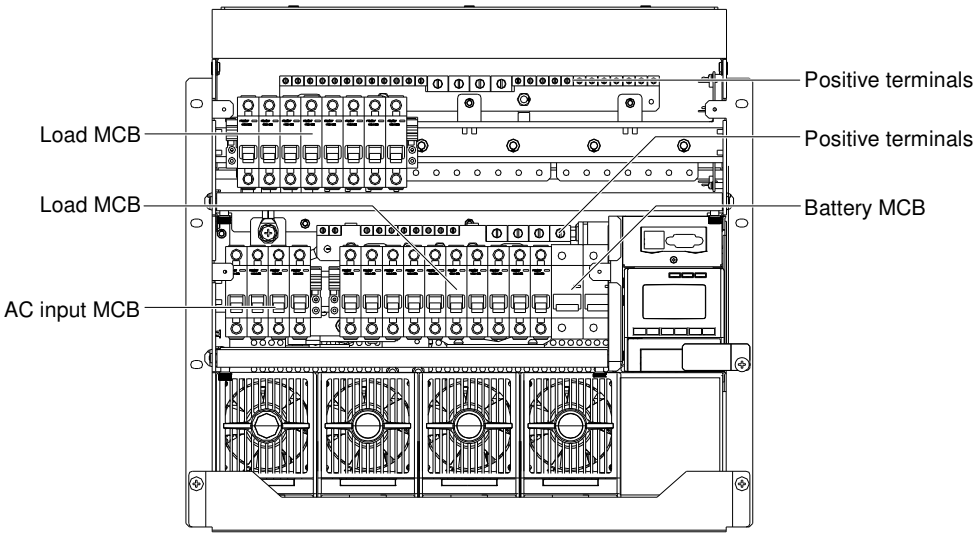


Figure 2-5 MCB and terminal positions

Connecting load cables

Connect the negative cable of the load to the upper terminal of load MCB. Connect the positive cable of the load to the DC positive busbar. The terminals are as shown in Figure 2-5.

Connecting battery cables

Note

1. The batteries may have dangerous current. Before connecting the battery cables, the corresponding battery input MCBs or the battery cell connector must be disconnected to avoid live state of the power system after installation.

2. Be careful not to reverse connect the battery. Otherwise, both the battery and the power system will be damaged!

1. Connect one end of the negative battery cable to the upper terminal of battery MCBs. Connect one end of the positive battery cable to the DC positive bus bar.

2. Connect copper lugs to the other end of the battery cables. Bind the connecting parts with insulating tape, and put them beside the battery. Connect the cables to the battery when the DC distribution unit is to be tested.

2.4.2 Connecting Signal Cables

S6415X2 user connector board cable connection

Take the NetSure 501 A50 power supply system as an example, the position of the user connector board is shown in Figure 2-6. Two communication interfaces are located in the panel: Ethernet and RS232 interface. The power supply system can be connected to Ethernet through the Ethernet interface or connected to modem through RS232 interface.

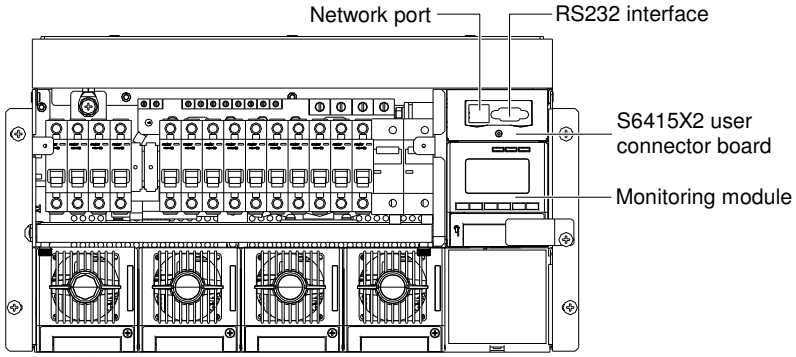


Figure 2-6 User connector board position

The interfaces of the signal transfer board are shown in Figure 2-7. The functions of the interfaces are shown in Table 2-3.

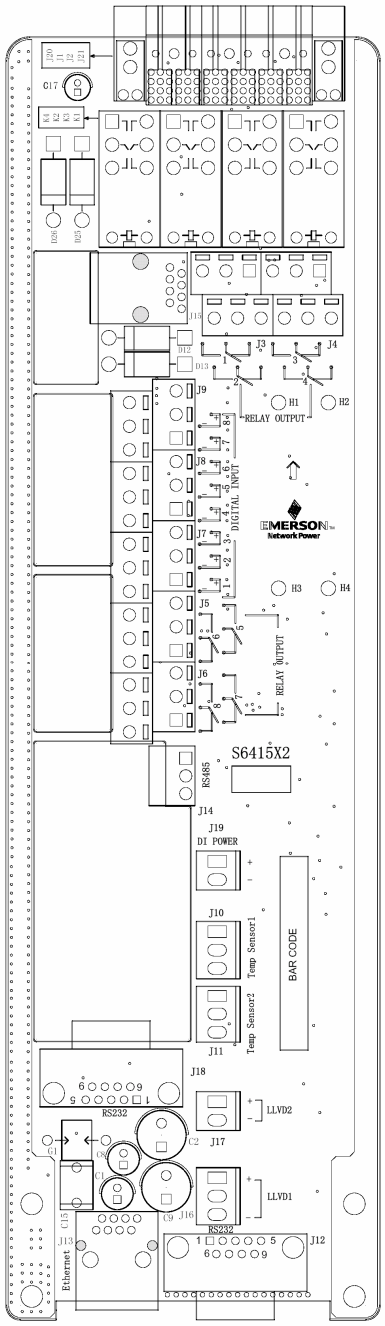


Figure 2-7 S6415X2 interface

Table 2-3 Interface functions

Connector	Pin	Signal name	Mark number	Logic relation
J3	1	Relay output 1 normal close	DO1_NC	
	2	Relay output 2 normal close	DO2_NC	
	3	Relay output 1 common	DO1_COM	
	4	Relay output 2 common	DO2_COM	
	5	Relay output 1 normal open	DO1_NO	
	6	Relay output 2 normal open	DO2_NO	
J4	1	Relay output 3 normal close	DO3_NC	
	2	Relay output 4 normal close	DO4_NC	
	3	Relay output 3 common	DO3_COM	
	4	Relay output 4 common	DO4_COM	
	5	Relay output 3 normal open	DO3_NO	
	6	Relay output 4 normal open	DO4_NO	
J5	1	Relay output 5 normal close	DO5_NC	
	2	Relay output 6 normal close	DO6_NC	
	3	Relay output 5 common	DO5_COM	
	4	Relay output 6 common	DO6_COM	
	5	Relay output 5 normal open	DO5_NO	
	6	Relay output 6 normal open	DO6_NO	
J6	1	Relay output 7 normal close	DO7_NC	
	2	Relay output 8 normal close	DO8_NC	
	3	Relay output 7 common	DO7_COM	
	4	Relay output 8 common	DO8_COM	
	5	Relay output 7 normal open	DO7_NO	
	6	Relay output 8 normal open	DO8_NO	
J10	1	Digital circuits power	+5V	
	2	Temperature signal 1 input	TEMP1	4~20mA
	3	Analog ground	GND	
J11	1	Digital circuits power	+5V	
	2	Temperature signal 2 input	TEMP2	4~20mA
	3	Analog ground	GND	
J12, J18	1	Data Carrier Detect	DCD232	
	2	Receive Data	RXD232	
	3	Transmit Data	TXD232	
	4	Data Terminal Ready	DTR232	
	5	Data Communication ground	DGND	
	6		Empty	
	7	Request To Send	RTS232	
	8,9		Empty	
J13	1	Ethernet TX+	NETTX+	
	2	Ethernet TX-	NETTX-	
	3	Ethernet TR+	NETTR+	
	4		Empty	
	5		Empty	
	6	Ethernet TR-	NETTR-	
	7~12		Empty	
J14	1	RS485 communication+	E485+	
	2	RS485 communication-	E485-	
	3	Protection ground	PGNG	
J19	1	48V+	POWER+	
	2	48V-	POWER-	

Modem cable connection

Modem is an optional accessory, suitable for those who have purchased the modem remote monitoring system.

Modem configuration:

In modem mode, "Y" should be selected for the communication parameter "MODEM" of the monitoring module. If modem has the Automatic Answer indicator (AA), the indicator will turn on once modem and monitoring module are

powered on. In the modem mode, the monitoring module will initialize modem upon power-on, reset or upon communication interruptions that last more than one hour.

Chapter 3 Installation Testing

This chapter introduces procedures of installation testing. The corresponding safety rules shall be adhered to in the test.

3.1 Installation Check And Startup

Before the test, inform the chief manufacturer representative. Only trained electrical engineer can maintain and operate this equipment. In operation, the installation personnel are not allowed to wear conductive objects such as watches, bracelets, bangles and rings.

During operation, parts of this equipment carry hazardous voltage. Misoperation can result in severe or fatal injuries and property damage. Before the test, check the equipment to ensure the proper earthing. Installation check must be done before testing. Then the batteries can be charged for the first time.

Make sure that the AC input MCBs, battery MCBs and load MCBs are switched off. Make sure that all the devices are properly installed.

Installation check

	OK	Comments
Check all the MCBs and cables. Are their models correct?	☐	
Check the bus bar connections, input and output cable connection, and connection between the power system and the system grounding.	☐	
Check the if the number and connections of the batteris are correct. Check the polarity of the battery string with a voltmeter.	☐	
Make sure all the cable connections are firm and reliable.	☐	

Startup preparations

	OK	Comments
Make sure that all the MCB are switched off.	☐	
Measure the AC input voltage. Make sure the input voltage is within the allowable range.	☐	Umin=___V
Check that the communication and alarm cables are connected to the signal transfer board.	☐	
Check that the temperature sensor, if any, has been installed.	☐	
Check that the battery string circuit is not closed.	☐	
Connect the disconnected batteries to the battery string circuit	☐	
Measure with a voltmeter across the connection points of each battery and make sure that the polarity is right. For a lead-acid battery with 24 cells, the voltmeter should read 2.0-2.1V/cell or 48-51V/battery. If the voltage of certain cell is lower than 2.0V, that cell must be replaced.	☐	Umin=___V
Check with an ohmmeter that there is no short circuit between the positive & negative distribution bus bars, or between the positive & negative battery poles (Note: Pull out all modules before the check and restore them after the check)	☐	

Startup

	OK	Comments
Switch on the system AC input MCB. The green LED on the rectifier will be on and the fan will start running after a certain delay. The monitoring module will show that the power supply voltage is 53.5V.	☐	
Check the system voltage and busbar polarity with a voltmeter. The voltage difference between the measured value and displayed value should be less than ! 0.2V.	☐	
Start and stop each rectifier of the system by unplugging and inserting each rectifier. Check their output voltages.	☐	

3.2 Basic Settings

When the system is put into service for the first time, the parameters of monitoring module must be set based on the actual system configuration, such as battery number, capacity, user's charge current limit and other functional requirements. Only after that can the monitoring module display system operation information and control the output.

For monitoring module parameter setting method, see *4.7 Setting System Parameters* if using M500D. *5.2.5 Parameter Set* if using M800D. See *5.7 Setting System Parameters* if using M501D.

	OK	Comments
The system model has been set correctly in factory before delivery, check that the setting agrees with the actual system (NetSure 501 A50: 48V/30A/SET/NONE; NetSure 701 A51 (PS48300-3A/3200): 48V/50A/300/ NONE; NetSure 701 A51 (PS48300-3A/3200-X2): 48V/50A/SET/NONE; NetSure 501 AA0: 48V/30A/300/NONE).	☐	
The battery string number set at the monitoring module should be the same as the number actually connected. (By default: 2)	☐	
Set the battery capacity according to the actual capacity of the battery connected to the system. Default: 300Ah.	☐	
Configure the temperature coefficient according to the battery manufacturer's requirement. Setting range: 0-500mV/℃. By default: 72mV/℃. (if no temperature sensor is installed, do not set this parameter)	☐	
Set the charge current limit according to your needs. Setting range: 0.1~0.25C_{10}. (By default: 0.1C_{10})	☐	
Set the monitoring module according to the voltage suggested by the battery supplier. Floating Charge (FC) voltage range: 42V ~ Boost Charge (BC) voltage. Default: 53.5V. BC voltage range: FC voltage ~ 58V. By default: 56.4V. For batteries that do not need BC, set the BC voltage to FC voltage plus 0.1V.	☐	
Put through the battery MCBs and connect the batteries.	☐	

3.3 Alarm Check And System Operation Status Check

Alarm check

Check that all functional units can trigger alarms that can be displayed on the monitoring module.

	OK	Comments
Pull out one rectifier. The "Rect N Com Failure" alarm should be triggered. Insert the rectifier in. The alarm should disappear. Repeat the same procedures on other rectifiers.	☐	
Remove battery MCB 1. The "Batt1 Failure" alarm should be triggered. Put on the MCB. The alarm should be cleared. Repeat the same on battery MCB 2.	☐	
Switch off a load MCB connected to a load route. The alarm "Load N Failure" should be triggered. Switch on the MCB, and the alarm should be cleared. Repeat the same on the other load MCBs.	☐	
Remove all the battery input MCBs. Keep only one rectifier in operation. Through the monitoring module, adjust the rectifier FC voltage to make it lower than the alarm point. The alarm "DC Voltage Low" should be triggered.	☐	
Keep the rectifiers in operation. Set through the monitoring module the battery management parameter to "Manual". Enter the maintenance menu at the monitoring module. Select "Disconnect" and confirm it. The battery protection contactor should be open, and the "BLVD" alarm should be displayed at the monitoring module.	☐	

Note: when the preceding alarms are generated, the monitoring module will give alarms after approximately 3s. Refer to *4.5 Querying Alarms And Setting Alarm Plans*, *5.2.3 Running Information* or *6.5 Querying And Handling Alarms* for methods of querying alarms.

System operation status check

There should be no alarms during normal system operation. The system operation status check can be conducted through the monitoring module.

For the parameter query method, refer to *4.3 Querying System Status* if using M500D. *5.2.3 Running Information* if using M800D. Refer to *6.3 Querying System Status* and *6.4 Querying Rectifier Status* if using M501D.

	OK	Comments
The system model is NetSure 501 A50: 48V/30A/SET/NONE; NetSure 701 A51 (PS48300-3A/3200): 48V/50A/300/ NONE; NetSure 701 A51 (PS48300-3A/3200-X2): 48V/50A/SET/NONE; NetSure 501 AA0: 48V/30A/300/NONE		
The monitoring module should display the correct AC voltage.	☐	
The monitoring module should be able to display the DC voltage. The difference between the displayed voltage and that measured at the bus bar should be less than 1%.	☐	
The monitoring module should display the battery current. The difference between the displayed and measured battery current should be less than 1%.	☐	
Check the number of the rectifier through the monitoring module. The number should be consistent with the actual number.	☐	

	OK	Comments
Check the voltage, current, current limiting point of rectifiers through the monitoring module. They should agree with the actual parameters.	☐	
For the system configured with temperature sensor, the monitoring module should be able to display the battery ambient temperature. Hold the probe of the temperature sensor with hand and watch the monitoring module, which should diplay the change of temperature.	☐	

3.4 Final Steps

	OK	Comments
Disconnect all test equipment from the system and make sure that materials irrelevant to the equipment have been all removed.	☐	
Restore the equipment to its original condition and close the cabinet door.	☐	
Check and handover the equipment that the user has purchased.	☐	
Note down all the operations taken, including time of the operation and name of the operator.	☐	

If any defect is found in this equipment, inform the personnel responsible for the contract.

If repairing is needed, please fill in the FAILURE REPORT and send the report together with the defective unit to the repairing center for fault analysis.

Chapter 4 Use Of Monitoring Module M500D

This chapter introduces the front panel and functional keys briefly, and expounds screen contents, access method, system controlling, information querying and parameter setting.

After the monitoring module is powered on, the language selection screen will pop up, and the monitoring module is initialized. The default language is Chinese. After the initialization, the first system information page will appear.

4.1 Front Panel

There are backlit LCD display, functional keypad, indicators and positioning pin on the front panel of M500D monitoring module, as shown in the following figure:

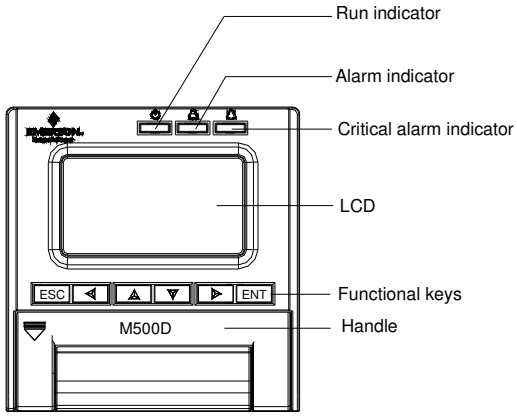


Figure 4-1 Front panel of M500D monitoring module

Description of the indicators on the front panel is in the following table:

Table 4-1 Monitoring module indicator description

Indicator	Normal state	Fault state	Fault cause
Run (green)	On	Off	No operation power supply
Alarm (yellow)	Off	On	There are observation alarms
Critical alarm (red)	Off	On	There are major or critical alarm

M500D monitoring module uses a 128 × 64 LCD, a keypad with 6 keys. The interface language is Chinese/English optional.

Table 4-2 Description of monitoring module keypad

Key	Function
ESC	Return to the upper level menu
ENT	Enter the main menu or confirm the menu operation
"▲" and "▼"	Shift among parallel menus. For a character string, these 2 keys can be used to shift among different options
"◀" and "▶"	Change values at a value setting interface. For a character string, these 2 keys can move the cursor left or right

4.2 Power On Order

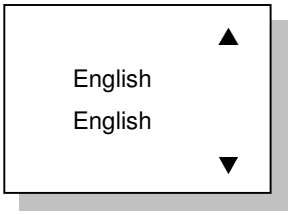
After the system is powered on for the first time, you should set the system type according to the actual configuration. The monitoring module will restart after the system type is changed. In that case, you should re-configure those parameters whose default values are inconsistent with the actual situation. Only after that can the monitoring module operate normally.

After configuring the system parameters, you can carry out various operations directly without resetting the parameter values. As for those important parameters related to battery management, such as BLVD, you should be fully aware of their influence upon the system before you change their values.

Note

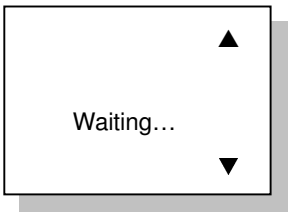
For the exact meanings of the abbreviations used in LCD displayer, see *Appendix 7 Glossary.*

1. The LCD will prompt you to select a language once the monitoring module is powered on.

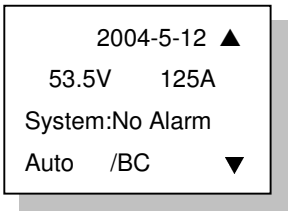


You can use "◄", "►", "▲" or "▼" to select the language you want, and press "ENT" to confirm.

2. The monitoring module will prompt you to wait, and start initialization.

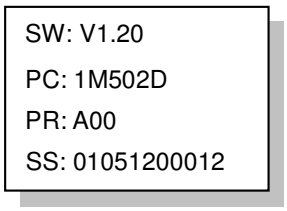


3. The first system information page appears

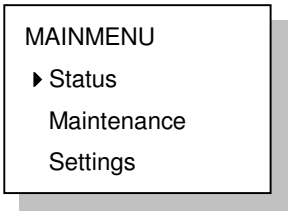


The system information is shown in many pages. You can repeatedly press "▼" to view other system information pages in a cycle.

4. At any system information page, press "ESC" to enter the help page, which displays software version (SW), product code (PC), product reversion (PR) and serial number (SS).



5. At any system information page, press "ENT" to enter the "MAIN MENU" page, which contains 3 sub-menus: "Status", "Maintenance" and "Settings".



You can press "▲" or "▼" repeatedly to select a sub-menu, and press "ENT" to enter the sub-menu. Press "ESC" to return to the menu of higher level.

1) Status

Including rectifier information, active alarm information and alarm history information.

2) Maintenance

The maintenance operation can be conducted only when the battery management mode is set to "Manual". The maintenance includes battery FC, BC and test, load power off/on, battery power off/on and rectifier voltage trimming, current limit, switch control and resetting.

3) Settings

Including the setting of alarm parameter, battery parameter, AC/DC parameter, rectifier parameter and system parameter.

4.3 Querying System Status

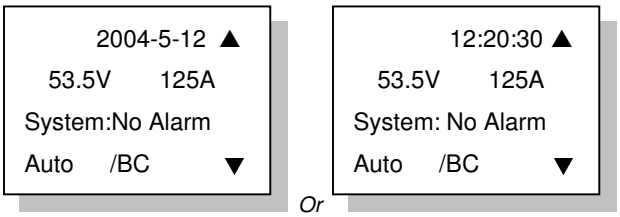
4.3.1 First Page Of System Information

1. At the main menu page, press “ESC” to return to the first system information page.

2. If no operation is conducted on the monitoring module keypad for 8 minutes, the LCD will return to the first system information page and shut down the back light to protect the screen. Pressing any key will turn on the back light.

The first system information page contains the major system operation information, including date/time, busbar voltage, total load current, system operation state (normal or alarm), battery management mode (AUTO or MANUAL) and battery state.

Among which, the battery state include FC, temperature compensation, BC, Cyclic Boost, test, short test and scheduled test. The current time are displayed in two pages shifting at the interval of 2s. One page shows year, month and date, the other shows hour, minute and second. The year is displayed with four digits; other time units are in two digits.



Note

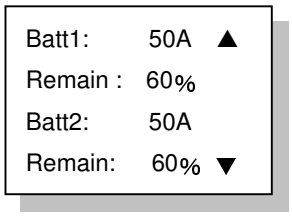
1. At this page, you may use “◄” and “►" to adjust the LCD contrast (7-level).

2. If there has been no keypad operation for 8 minutes, the monitoring module will return to the first system information page. The time of that return will be recorded automatically, and can be queried through the host.

4.3.2 Other System Information Pages

The system information is shown in many pages. The default page of the monitoring module after the system power on is the system information first page. You can press “▲” or “▼” to scroll up or down to view more operation information, as shown in the following page:

Battery information page



1. Battery 1, battery 2

They represent respectively the current of the battery that battery shunt 1 and shunt 2 is connected to. If the “Shunt Coeff” of a certain battery group is set to “No”, this situation will be reflected at the battery information page by “Not connected”, and no actual capacity will be displayed.

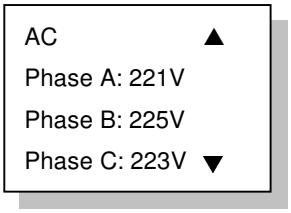
2. Actual battery capacity

The monitoring module can approximately calculate the remaining battery capacity in real time. Through configuration at the host, the remaining battery capacity can be displayed in the mode of percentage, remaining Ah or remaining time, etc. The default is the percentage.

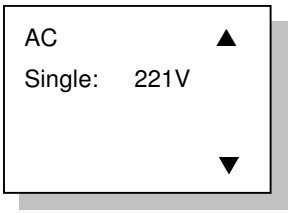
During the normal BC/FC management, the monitoring module regards the rated capacity as the capacity that each battery group can reach. When the battery discharges, the monitoring module will calculate the battery remaining capacity according to the discharge current, discharge time and the preset “battery discharge curve”. When the battery is being charged, the monitoring module will calculate the real-time battery capacity according to the detected charge current, charge time and preset “battery charge efficiency”. If the calculated battery remaining capacity is higher than the rated capacity, the monitoring module will automatically change the calculated battery remaining capacity to the rated capacity.

AC information page

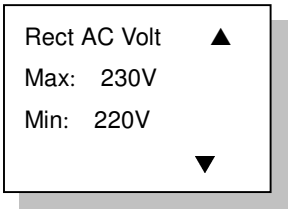
1. If the power system is a 3-phase input system with manual-switchover between 2 AC inputs, the voltage of the three phases will be displayed.



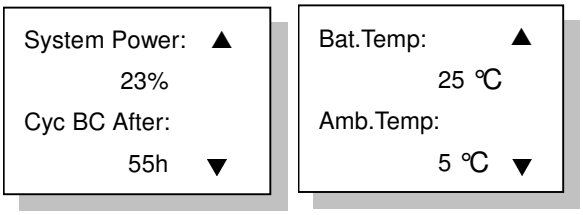
2. If the power system is a 1-phase input system with manual-switchover between 2 AC inputs, the single-phase voltage will be displayed.



3. If there is no AC sampling board in the power system, the LCD will display the max and min AC input voltages of all rectifiers.



BC prompt and temperature information page



If the monitoring module bans BC and no temperature sensor is configured, this page will not be displayed.

The first line of the information page displays the BC prompts, which will be different with different systems, including:

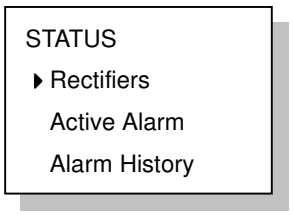
1. Prompt the time of next Cyclic Boost according to the battery state
2. If BC is going on, the “Charging” will be prompted
3. If BC is disabled, this row will be empty

The 2nd and 3rd rows of the page are the temperature information detected by the temperature sensor. The display will vary with different parameter settings (see 4.7 for parameter setting). If the temperature sensor is not connected or is faulty, system will prompt invalid. Meanwhile, the 4th row will display “Check Temp Sensor”.

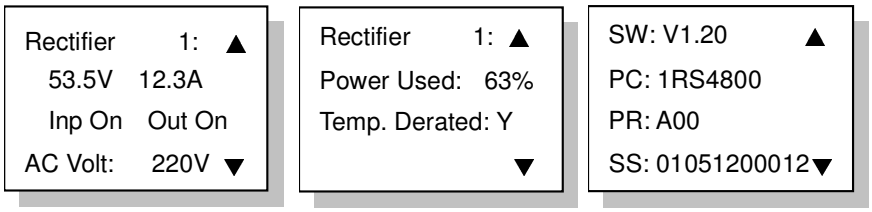
4.4 Querying Rectifier Status

The rectifier information includes the rectifier serial No., voltage, current, current limit, mains situation, rectifier power limit and temperature power limit.

1. At any page of the system information, press “ENT” to enter the main menu.
2. Use “▲” or “▼” keys to select the “Status” sub-menu in the main menu, and press “ENT” to confirm.



3. Use “▲” or “▼” to select the “Rectifiers” submenu, as shown in the above figure. Press “ENT” to confirm.



The information of every rectifier is displayed in three pages. The information in the first page includes: output voltage and current, input/ output on/off state and AC input voltage. The information in the second page includes: the states of “Power Used” (the percentage of actual output power in rated output power) and “Temp Derated”. The information in the third page includes: software version (SW), product code (PC), product reversion (PR) and serial number (SS). Press “►” to scroll to the next page, or “◄” to return to the last.

4. Press “▼” or “▲” to query other rectifier’s information.

At most 48 pieces of rectifier’s information can be displayed. If the rectifier does not exist, there will be no information. If the rectifier communication is interrupted, the information will be displayed in high light.

5. At any rectifier information page, press “ESC” repeatedly and you can return to the higher-level menus.

4.5 Querying Alarms And Setting Alarm Plans

The monitoring module can locate and record the system fault according to the collected data, as well as raise audible/visual alarms and output through dry contact according to the preset alarm level. Meanwhile, it reports the alarms to the host.

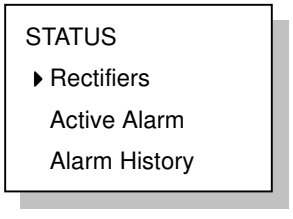
You can query historical alarms and active alarms through the LCD of the monitoring module.

4.5.1 Querying Active Alarm

When a new alarm is raised, and there is no operation on monitoring module keypad within 2 minutes, the LCD of the monitoring module will prompt automatically the active alarm.

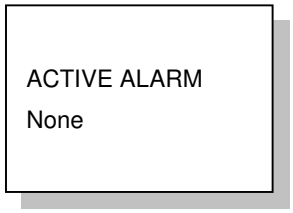
If there are multiple alarms in the current system, you can query alarms through the following steps:

1. At any system information page, press “ENT” to enter the main menu
2. Use “▲” or “▼” to select the “Status” submenu in the main menu and press “ENT” to confirm.

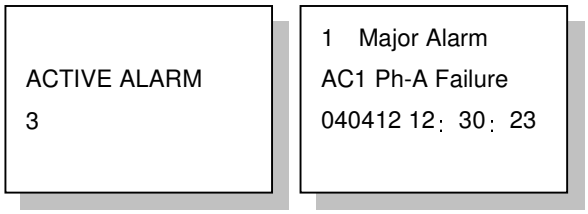


3. Press “▲” or “▼” to select the “Active Alarm”, as shown in the above figure, and press “ENT” to confirm.

1) If there is no active alarm, “Active Alarm: None” will be displayed

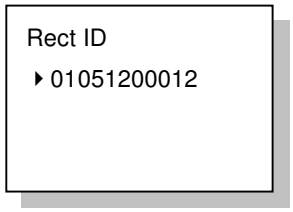


2) If there is any alarm, the display will be like the following:

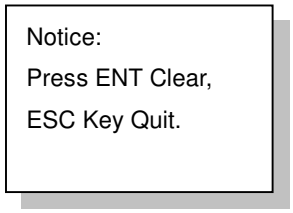


The information in the active alarm information pages includes: alarm serial No., alarm level, alarm name and time (year, month, day, hour, minute and second). The alarm raising time determines the sequence it is displayed, with the latest alarm displayed first. Use “▲” or “▼” to view all active alarms.

While querying rectifier alarms, press “►”, and the rectifier ID will be displayed, and the “Run” indicator of the corresponding rectifier will blink.



In the case of battery test alarm or maintenance time alarm, press “►” to display the prompt information.



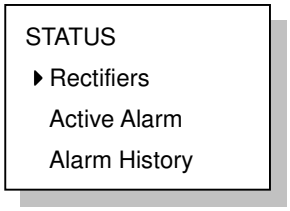
In the prompt page, press “ENT” to confirm the alarm.

4. At any active alarm information page, press “ESC” repeatedly and you can return to the higher-level menus.

4.5.2 Querying Alarm History

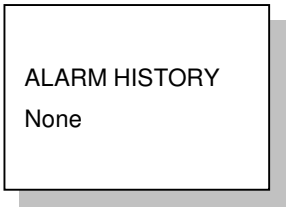
1. At any system information page, press “ENT” to enter the main menu

2. Press “▲” or “▼” to select the “Status” submenu, and press “ENT” to confirm.

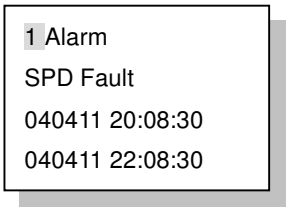


3. Use "▲" or "▼" to select the "Alarm History", as shown in the above figure and press "ENT" to confirm.

If there is no historical alarm, the prompt will be "Alarm History: None".



The historical alarms of the monitoring module are stored in cyclic order. Up to 200 alarms will be recorded. Above that, the earliest alarm will be cleared automatically.



At the monitoring module, the displayed historical alarm information includes: alarm serial No., alarm name and alarm start/end time (year, month, day, hour, minute, second).

If it is a rectifier that raised the alarm, the ID of that rectifier will be displayed.

4. At any Alarm History information page, press "ESC" repeatedly to return to the higher-level menus.

4.5.3 Alarm Type Table

The alarm type table of the system is as follows.

Table 4-3 Alarm type table

Serial No.	Alarm	Description	Default alarm level	Default related relay	Related parameter configuration
1	Load Fuse Alarm	Load failure caused by overload, short circuit, manual disconnect, and alarm circuit failure	Critical	6	
2	LVD1	Load low voltage disconnects	Critical	5	LLVD enabled
3	LVD2	Battery low voltage disconnects	Critical	4	BLVD enabled
4	Batt Curr High	Charging current of battery higher than the setting of "Over" (Charging over current limit)	Observation	None	
5	Batt Fuse Alarm	Batt Failure caused by overload, short circuit, manual disconnect, and alarm circuit failure	Critical	None	
6	Non Float Status	Including auto boost charge, cyclic boost charge, constant current test, and short test	NoAlarm	7	
7	Batt Discharge	Battery is discharging	NoAlarm	None	
8	Curr Discrepancy	If the DC Power System has shunts, the addition of measured load current and Battery current differs rectifier output current noticeably	NoAlarm	None	
9	Short Test Fail	Short Test Fault, In short test, difference in discharging current of two batteries is bigger than setting value	Observation	None	
10	Batt Test Fail	Battery discharging time shorter than expected	Observation	None	
11	Volt Discrepancy	Actual output voltage is different from both the measured DC bus voltage and different from the voltaged reported by the rectifier to SCU. The error is bigger than 1V	Observation	None	
12	DC Volt Low#2	DC output voltage very low	Critical	2	DC output under-voltage alarm point
13	DC Volt Low#1	DC output voltage low	Critical	2	DC output under-voltage alarm point
14	DC Volt High#1	DC output voltage high	Critical	2	DC output over-voltage alarm point

Serial No.	Alarm	Description	Default alarm level	Default related relay	Related parameter configuration
15	DC Volt High#2	DC output voltage very high	Critical	2	DC output over-voltage alarm point
16	Mains Failure	All the AC input voltages from the rectifier are less than 80V	Major	1	
17	AC Voltage Low2#	AC input voltage less than “AC Low#2”. The default for AC Voltage Low#2 is 80Vac	Observation	None	AC input under-voltage alarm point
18	AC Voltage Low1#	AC input voltage lower than the setting of “AC Low#1”. The default for AC Voltage Low#1 is 180Vac	Observation	None	AC input under-voltage alarm point
19	AC Voltage High	AC input voltage higher than the setting of “AC High”. The default for AC Voltage High is 280Vac	Observation	None	AC input over-voltage alarm point
20	Maintain Alarm	Time to maintain system	Observation	None	
21	Self-detect Err	Hardware Self-detect Error	No Alarm	None	
22	Manual Mode	Battery management is in manual control mode	Observation	None	
23	High Load	When system reaches settable level of total capacity. The default is 75%			
24	Power Major	System contains Major or Critical alarm (red LED)	Critical	None	
25	Power Minor	System contains Observation alarm (yellow LED)	Critical	None	
26	Rectifier Lost	The controller has detected a reduction in the number of running rectifiers	Observation	None	
27	Multi-Rect Alarm	More than two rectifiers alarm	Critical	None	
28	Load share Alarm	The output current of one rectifier is higher than the certain value and higher than the average value for all rectifiers	Critical	None	
29	Rect Not Respond	Rectifier does not communicate with M500D	Major	3	
30	Rect AC Fail	AC input voltage of this rectifier lower than 80V	Major	3	
31	Rect HVSD	This rectifier output voltage was higher than the rectfier HVSD setting and has shut down	Major	3	
32	Rect Failure	Serious load sharing alarm (the output current of the rectifier is lower than 1A and the average load is greater than 6A). Or rectifier’s ID repetition	Critical	3	
33	Rect Protect	AC over voltage or Rectifier PFC failure or current imbalance or Over-temperature or AC Low voltage or AC phase loss or position pin failure or Inner communication fault	Observation	3	
34	Rect Fan Fails	Rectifier fan fails	Major	3	
35	Rect Derated	Rectifier AC input voltage is low and the rectifier internal temperature is high and high load	Observation	3	
36	Temp Alarm	Temperature higher or Lower than the setting of Temp,inluding Ambient temp and battery Temp	Observation	None	
37	Batt Over Temp	Battery temperature higher than the setting of “High Temp”, inluding temperature sensor fault	Major	None	Over-temperature alarm point
38	Digital 1 ~ Digital 6	Alarm name can be defined by users. Whether the alarm is triggered at high voltage level or low voltage level can be configured	No alarm	8	
39	Digital7 /LVD1 Alarm	Alarm name can be defined by users. Whether the alarm is triggered at high voltage level or low voltage level can be configured	No alarm	None	
40	Digital8 /LVD2 Alarm	Alarm name can be defined by users. Whether the alarm is triggered at high voltage level or low voltage level can be configured	No alarm	None	

4.5.4 Changing Audible/Visual Alarm And Alarm Call Back Plan

There are different audible/visual alarms and call back modes for alarms of different levels. For the products in China market, the alarming mode for major alarms and critical alarms are the same.

Table 4-4 Different alarms and call back modes for different alarm levels

Alarm level	Red indicator	Yellow indicator	Alarm horn	Call back	Remark
Critical	ON	/	ON	Y	Callback No. can be set
Major	ON	/	ON	Y	Callback No. can be set
Observation	/	ON	OFF	N	
No alarm	OFF	OFF	OFF	N	

Therefore, changing the alarm level of different alarms may change their audible/visual alarm mode and call back plan too.

Pressing any key on the monitoring module can silence the alarm sound. The sound will disappear and alarm indicator will be off when all alarms are cleared.

You can configure how long an alarm sound will last, or choose to make no alarm sound. For details, see *4.7.11 Alarms Settings.*

4.5.5 Changing Alarm Types Of Dry Contacts

As one of the alarm type parameter, “Related Relay” refers to the serial No. of the dry contract corresponding to the alarm type, whose value is either 1 ~ 8 or “None”. “None” means there is no corresponding dry contact. For details, see *Alarm Settings*.

4.6 Maintenance

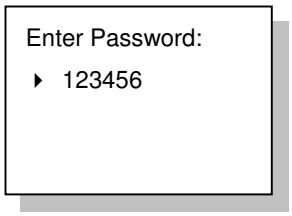
Note

1. This operation can be conducted only when the battery management is set to “Manual”.
2. Be careful! BLVD operations may result in power interruption.

1. At any information page, press “ENT” to enter the main menu.
2. Press “▼” to select the “Maintenance” menu.

You cannot enter the system Maintenance menu if the “Battery Management” is set to “Auto”.

3. Press “ENT” and input the correct operation password. Press “ENT” again to enter the “Maintenance” menu.



To input the password, use “▲” or “▼” to modify numbers, and use “◄” or “►” to move the cursor. After the input, press “ENT” to confirm.

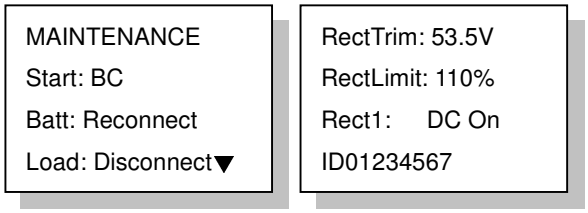
If the password is incorrect, system will prompt “password incorrect”.

Note

You can choose to enter the “Maintenance” menu by using either the user, operator or administrator password, for in this menu, all users have the same authority.

4. Press “▲” or “▼” to scroll to the operation page you need.

There are two pages:



5. Press "◄" and "►" to select the needed action.

“Start”: The options include “FC”, “BC” and “Test”. If system is not configured with any battery, the control would be invalid. If there is AC power off alarm, or the busbar voltage is too low, the BC and battery test control will not be executed by the system. No battery test control can be conducted when the rectifier communication is interrupted. Finally, after the battery test, the battery management mode will be changed from “Manual” to “Auto” automatically.

“Battery”: The options include “Reconnect” and “Disconnect”. If there is no battery, or there is a battery alarm, the battery operations will be invalid.

“Load”: The options include “Reconnect” and “Disconnect”.

The following maintenance over the rectifier can be conducted only when the power system is in the FC state.

”RectTrim”: Range: 42V ~ 58V. It can be used to improve the current sharing among rectifiers. Note that the value of this parameter cannot exceed the over-voltage alarm point, or the parameter will be invalid.

”RectLimit”: Range: 10% ~ 121%.

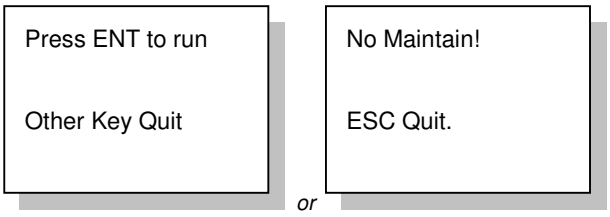
The maintenance operations over a single rectifier include: “DC ON/OFF”, “AC ON/OFF” and “Reset”. The operation method is:

1) Use “▲” or ” ▼” to select the rectifier parameter, and “◄” or “►” to change the rectifier serial No. Then press “ENT” to confirm. The bottom line of the page displays the rectifier ID.

2) Use “▲” or “▼” to move the cursor to the maintenance operation area, and “◄” or “►” to select the value.

If the rectifier voltage is too high, you can select “Reset” to restore the output voltage of that rectifier to normal.

6. There will be prompts as the confirmation of control commands. If the maintenance operation is valid, system will prompt you press “ENT” to confirm and execute the operation, or “ESC” to abort the operation. Otherwise, system will prompt you the operation is invalid, and press “ESC” to quit.



or

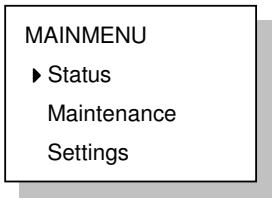
Press “ESC” to return to the menu of higher level.

4.7 Setting System Parameters

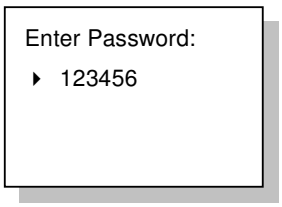
Battery parameters are very important, for they are related to the life of battery. Before delivery, the battery parameters have been initialized. Without any special needs, you only need to reset the battery group number and battery capacity, and accept the defaults for other parameters.

4.7.1 Parameter Setting Method

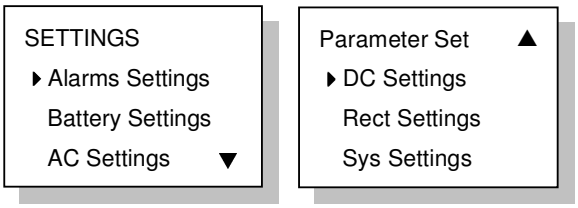
1. At any system information page, press “ENT” to enter the main menu.



2. Use “▲” or “▼” to select the submenu “Settings” and press “ENT” to confirm. System will then prompt you to input the password.



3. Press "◄" or "►" to select the number of password digits. Enter the password digit by digit using “▲” or “▼”. Press “ENT” to confirm and enter the parameter setting submenu.



Users with different password levels have different authorities. See the following table:

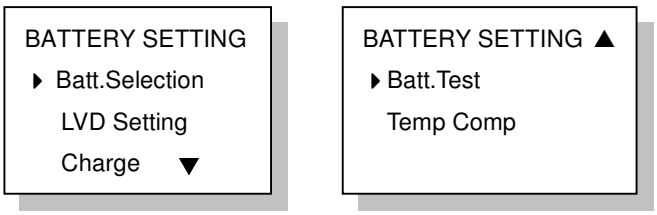
Table 4-5 Different password levels and relevant different authorities

Level	Authority	Default password
User	Configuration of general parameters	1
Operator	User’s authority, plus resetting system, resetting password and modifying system type	2
Administrator	Operator’s authority, plus modifying password of all levels, controling alarm sound volume, browsing system parameters that can be set only through the host	640275

4. There are two pages of “Settings”. Shift page by using “▼” or “▲”, and select the parameter by using “▼” or “▲”. Press “ENT” to confirm.

As shown in the above figure, the monitoring module divides the parameters to be set into 6 kinds: alarms parameter, battery parameter, AC parameter, DC parameter, rectifier parameter and system parameter.

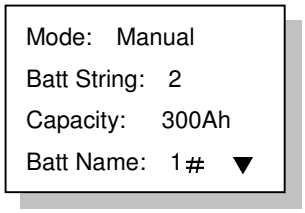
Among which, the battery parameters are divided into 5 kinds: basic, BLVD, charging management, battery test, temperature coefficient, and they are displayed in two pages, as shown below:



What follows is the description of the parameter functions and values by dividing them into 5 small categories and 5 big categories.

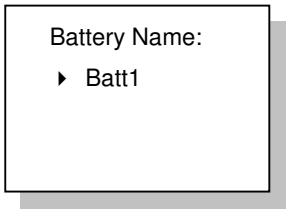
4.7.2 Battery Selection

1. The first page of the Battery Selection is shown below:



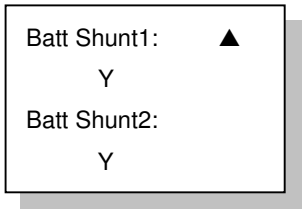
Use "▼" or "▲" to select the page and the parameter to be set, and "◄" or "►" to select the proper value for the parameter. Press "ENT" to confirm.

After setting the "Battery Type", the following prompt will appear, asking you to name a certain type of battery for the sake of identifying them:

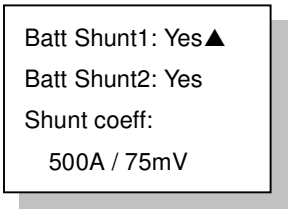


To name a rectifier, you can use "▲" or "▼" to change the number, and "◄" or "►" to move the cursor left or right. Press "ENT" to confirm afterwards.

2. If setting parameter "System Type" does not require setting the battery shunt coefficient, the second page of the basic battery settings is as follows:



3. If setting parameter "System Type" requires setting the battery shunt coefficient, the second page of the basic battery settings is as follows:



4. The value description of the basic battery parameters is listed below:

Table 4-6 Basic battery parameters descriptions

Parameter	Range	Defaults	Value description
Mgmt Mode (Management mode)	Auto, Manual	Auto	In normal situation, it should be in the "Auto" mode, which enables the monitoring module manage the whole power system automatically, including: Automatic FC/BC switchover, LLVD and BLVC. In the manual mode, you can do operations like BC, FC, test and battery on/off, as well as enabling automatic battery BC time protection and capacity calculation. Upon the system DC under-voltage alarm, system can automatically switch to the "Auto" mode, lest wrong manual operation should damage the system
Batt String (number of battery strings)	0 ~ 4	2	You should set this parameter according to the actual battery configuration. If "Batt Shunt" is set as "Y", there should be batteries actually configured
Rated AH (rated capacity)	50 ~ 5000Ah	300Ah	The total capacity of the battery strings connected to one battery shunt. You should set this parameter according to the actual battery configuration
BTT Name	1# ~ 11#	1#	

Parameter	Range	Defaults	Value description
Battery Name	10 characters		Name different battery types to identify them
Batt Shunt1	Yes, No	Yes	Select “Y” when a corresponding shunt is configured, otherwise, select “N”. Battery management aims at only the batteries connected to the shunt
Batt Shunt2		Yes	
Shunt Coeff (shunt coefficient)	Dependent on system type		In the system type setting, if the parameter “Shunt” is set to “Y”, this parameter will be displayed. Otherwise this parameter will take the default value, and is the same for both battery strings

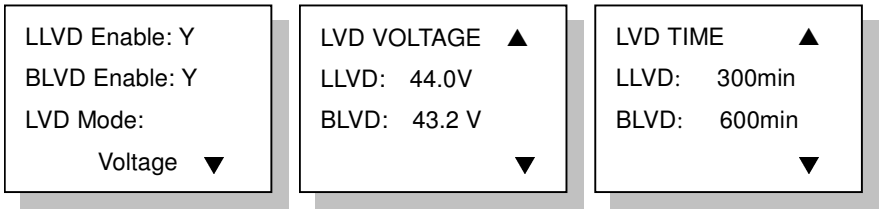
4.7.3 LVD Parameter Description

1. Function description

LLVD means the monitoring module opens the LLVD contactor, so that the non-priority load will be powered off. In this way, the battery remaining capacity can sustain the priority load longer.

BLVD means the monitoring module opens the BLVD contactor. In this way, the battery will stop powering the load, preventing over-discharge.

2. There are 3 related pages, as shown below:



Use “▼” or “▲” to select one page or one of the parameters, and “◄” or “►” to select the parameter value. Press “ENT” to confirm and save.

Note

Generally you do not need to set the LVD parameters’ value. The defaults will do.

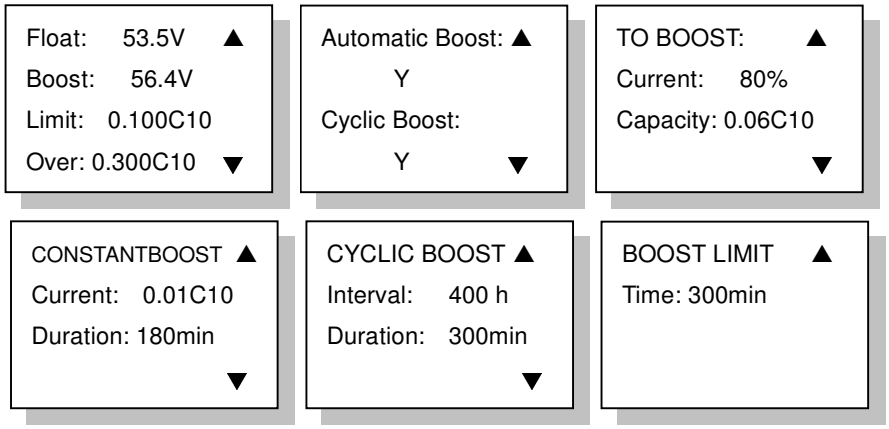
3. The value description of the LVD parameters is listed below.

Table 4-7 LVD parameters description

Parameter	Range	Default	Value description
LLVD Enable	Y, N	Y	Select “Y” to enable LLVD function
BLVD Enable			Select “Y” to disable the BLVD function
LLVD Mode	Time, voltage	Voltage	Select “Voltage”, when the monitoring module detects that the battery voltage is lower than the prestet “LLVD Volt”, the load will be disconnected, and so is the battery when the battery voltage is lower than the preset ‘BLVD Volt”. Select “Time”, when the discharge time reaches the preset “LLVD Time”, the monitoring module will disconnect the load; when the discharge time reaches the preset “BLVD Time”, it will disconnect the battery
LLVD Volt	40V ~ 60V	44.0V	
BLVD Volt		43.2V	
LLVD Time	3 ~ 1,000 min	300min	
BLVD Time		600min	

4.7.4 Charging Management Parameters

1. There are 6 related pages, as shown below:



Use "▼" or "▲" to select one page or one of the parameters, and "◄" or "►" to select the parameter value. Press "ENT" to confirm and save.

Note

Generally you do not need to set the management value. The defaults will do.

2. The charging management parameter value description is listed below:

Table 4-8 Charging management parameter value description

Parameter	Range	Default	Value description
Float	42V ~ 58V	53.5V	In the FC state, all rectifiers output voltage according to the set "Float"
Boost		56.4V	In the BC state, all rectifiers output voltage according to the set "Boost"
Limit (current limit)	0.1 ~ 0.25C_{10}	0.1C_{10}	When the monitoring module detects that the battery charging current is higher than the "Limit", it will control the current of the rectifiers, through which it can limit the battery charging current. C_{10} is the battery rated capacity, generally set to 10 ~ 20% of the rated capacity of one battery string
Over (over current point)	0.3C_{10} ~ 1.0C_{10}	0.300C_{10}	When the monitoring module detects that the battery charging current is higher than the "Over", it will raise the battery charge over-current alarm
Automatic Boost	Yes, No	Y	Select "Y", and BC will be conducted when conditions allow
Cyclic Boost			Select "Y", and the monitoring module will control the system to enter the Cyclic Boost when the FC time reaches the "Cyclic Boost Interval". The battery charging voltage is the preset "Boost", and the time is the preset "Cyclic Boost Time"
Cyclic Boost Interval	48 ~ 8760h	2400h	
Cyclic Boost Time	30 ~ 2880min	720min	
To Boost Current	0.050 ~ 0.080C_{10}	0.06C_{10}	The monitoring module will control the system enter the BC state when the battery capacity decreases to the value of "To Boost Capacity", or when the charge current reaches the "To Boost Current". The charge voltage will be the "Boost"
To Boost Capacity	10% ~ 99%	80%	
Constant BC Current	0.002 ~ 0.02 C_{10}	0.01C_{10}	The system in the BC state will enter the FC state when the charge current decreases to the "Constant BC Curr" and after the "Duration". The battery charge voltage then will be the "Float"
Duration (of constant BC)	30 ~ 1440min	180min	
Boost Limit	60 ~ 2880min	1080min	To ensure safety, the monitoring module will forcefully control the system to enter the FC state if during the BC state, the BC time reaches the "Boost Limit", or abnormalities occur (such as AC failure, battery route faulty, and rectifier communication failure etc.)

3. The BC/FC switchover diagram is shown below:

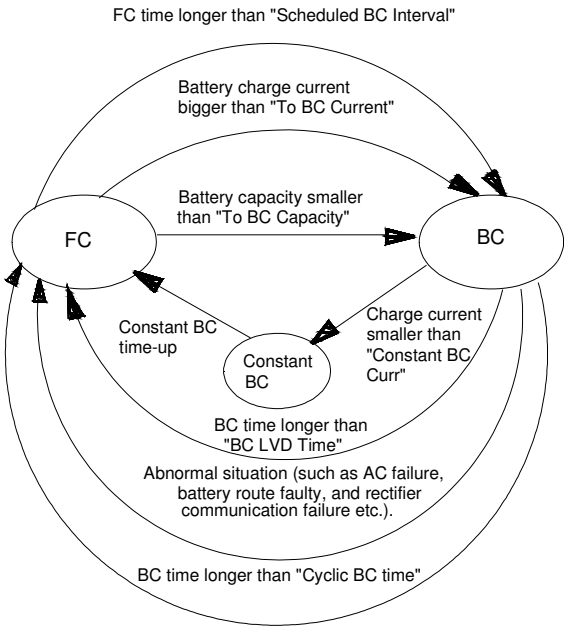
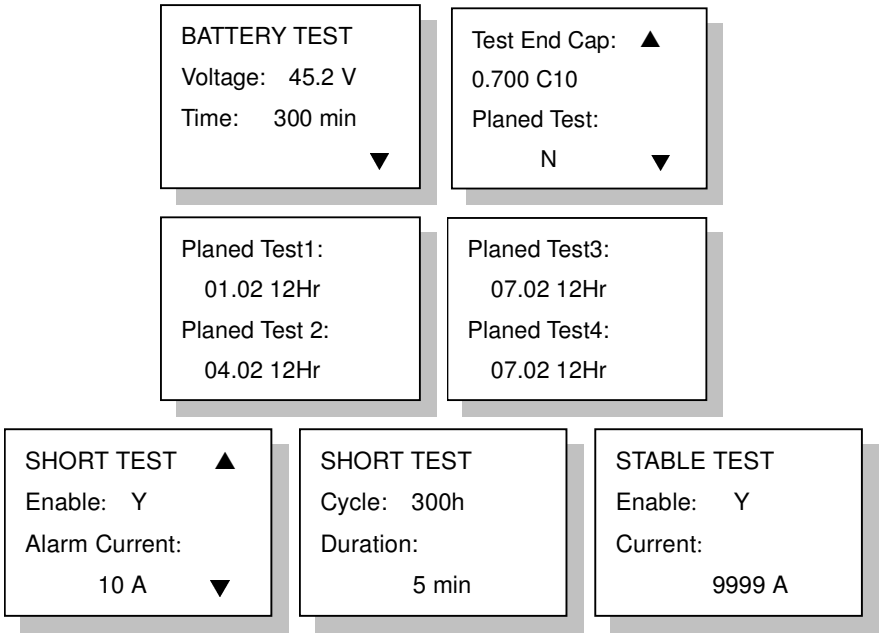

FC time longer than "Scheduled BC Interval"
Battery charge current bigger than "To BC Current"
Battery capacity smaller than "To BC Capacity"
FC
BC
Constant BC time-up
Charge current smaller than "Constant BC Curr"
Constant BC
BC time longer than "BC LVD Time"
Abnormal situation (such as AC failure, battery route faulty, and rectifier communication failure etc.).
BC time longer than "Cyclic BC time"

Figure 4-2 BC/FC switchover diagram

4.7.5 Battery Test Parameters

1. There are seven related pages, as shown below:



Use "▼" or "▲" to select one page or one of the parameters, and "◄" or "►" to select the parameter value. Press "ENT" to confirm and save.

2. The value description of the parameters is listed below:

Table 4-9 Battery test parameters description

Parameter	Range	Default	Value description
Battery test voltage	43.1V ~ 57.9V	45.2V	The monitoring module can do battery test, and record 10 sets of test data (accessible only through the host). The battery test has to be started manually, then monitoring module will control the rectifier output voltage, make it lower than the battery voltage, and the battery discharge will begin. Monitoring module will stop the test if the battery voltage reaches the "Battery test voltage", or the discharge time reaches "Battery test time", or the battery capacity reaches "Test End Cap". Afterwards, it will restore the rectifier output voltage to the normal FC voltage, begin the battery charge and switch the system to battery auto-management. Meanwhile the test start time/voltage and end time/voltage and battery remaining capacity will be recorded. The records can be queried through the host. During the battery test, if abnormalities occur, the monitoring module will stop the battery test automatically
Battery test time	5 ~ 1440min	300min	
Test End Cap (capacity)	$0.01C_{10}$ ~ $0.95C_{10}$	$0.7C_{10}$	
Scheduled Test	Y, N	N	When the parameter "Scheduled Test" is set to "Y", the monitoring module will test the battery according to the 4 sets of test time. You can set at most 12 sets of test time through the host
Planned Test 1	Month,day, hour	00:00, Jan. 1st	
Planned Test 2		00:00, April 1st	
Planned Test 3		00:00, July 1st	
Planned Test 4		00:00, Oct. 1st	
Alarm Current	1A ~ 100A	10A	If the battery have not discharged within the "ShortTest Cycle", the monitoring module will start a short test, whose operation time is set by the parameter "ShortTest Duration". By the end of the test, if the difference in the discharge currents of batteries is bigger than the "Alarm Current", the battery discharge imbalance alarm will be raised. This alarm will automatically end after 5min of delay. Also you can end it by confirming it
ShortTest Cycle	24h ~ 8,760h	720h	
ShortTest Duration	1 ~ 60min	5min	
StableTest Enable	Y, N	N	The stable test is conducted with constant battery current, whose value is set through the parameter "StableTest Current". If the parameter "StableTest Enable" is set to "Y", and the test will be started once the battery satisfies the test condition
StableTest Current	0 ~ 9999A	9999A	

3. The schematic diagram of the test function is shown below:

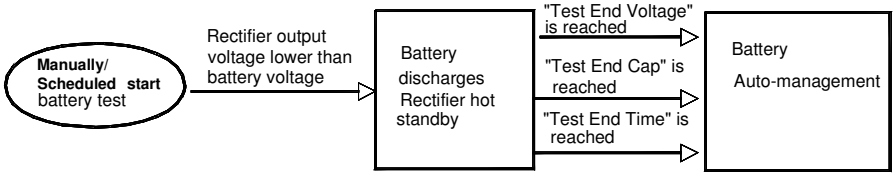
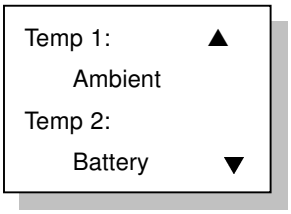


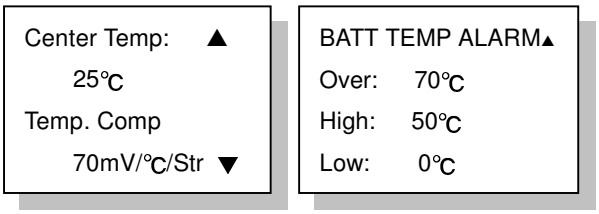
Figure 4-3 Schematic diagram of the test function

4.7.6 Temperature Compensation Coefficient Parameters

1. The first page of the setting interface is shown below:



2. If the "Temperature1" or "Temperature2" is set to "Battery Temp", you need to set the following parameters:



Use "▼" or "▲" to select one page or one of the parameters, and "◄" or "►" to select the parameter value. Press "ENT" to confirm and save.

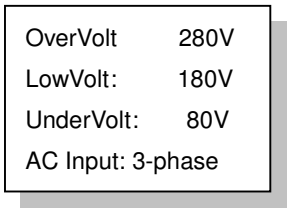
3. The value description of the parameters is listed below:

Table 4-10 Temperature compensation coefficient parameters description

Parameter		Range	Default	Value description	
Temperature1		Ambient Temp, None, Battery Temp	None	The "Ambient Temp" and "Battery Temp" refer to the measurement of the ambient or battery temperature sensor at the local power system. "None" means there is no measurement input. You should set this parameter according to the actual situation. The temperature measurement data will be displayed in the system operation information screen	
Temperature2					
When Temperature1 or Temperature 2 is set to "Battery Temp"	Center Temp	10℃ ~ 40℃	25℃	Batteries are sensitive to temperature. To ensure battery's capacity and life, its FC voltage should change together with the temperature: lower FC voltage for higher temperature, and vice versa. <FC = BattTemp – Center Temp % Temp Comp Upon alarms such as "Rect Com Failure", "DC Under-volt" and "DC Voltage High", the monitoring module will not do temperature compensation to the battery FC voltage. Set this parameter according to the actual battery technical parameters	
	Temp Comp	0 ~ 500mV/℃	72mV/℃		
	Over	10℃ ~ 100℃	50℃	When the detected battery temperature is higher than the "Over", the monitoring module will raise an alarm	The "High" must not be higher than the "Over"
	High	10℃ ~ 100℃	50℃	When the detected battery temperature is higher than the "High", the monitoring module will raise an alarm	
	Low	-40℃ ~ 10℃	0℃	The monitoring module will raise an alarm when the detected battery temperature is lower than the "Low"	

4.7.7 AC Settings

1. The configuration interface is shown below:



Use "▼" or "▲" to select one page or one of the parameters, and "◄" or "►" to select the parameter value. Press "ENT" to confirm and save.

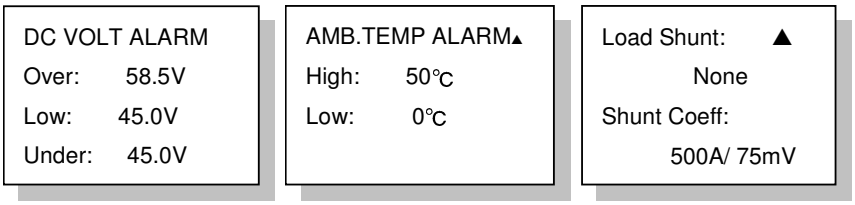
2. The value description of the parameters is listed below:

Table 4-11 AC Setting parameter description

Parameter	Range	Default	Value description	
OverVolt	50V ~ 300V	280V	The monitoring module will raise an alarm when the AC input voltage is higher than the "OverVolt"	The "OverVolt" must be higher than the "LowVolt". To avoid alrm disorder, it is suggested to use the default values
LowVolt	50V ~ 300V	180V	The monitoring module will raise an alarm when the AC input voltage is lower than the "LowVolt"	
UnderVolt	50V ~ 300V	80V	The monitoring module will raise an alarm when the AC voltage of an operating route is lower than the "UnderVolt", but there will be no alarm when the AC voltage of the standby route is lower than the "UnderVolt"	The "UnderVolt" must be lower than the "LowVolt"
AC Input	3-phase, Single Phase, None	3-phase	Set this parameter according to the actual situation. In a system with an AC sampling board, you can only select "Single Phase" or "3-phase"; in a system without an AC sampling board, you can select only "None"	

4.7.8 DC Settings

1. There are three related pages, as shown below:



Use "▼" or "▲" to select one page or one of the parameters, and "◄" or "►" to select the parameter value. Press "ENT" to confirm and save.

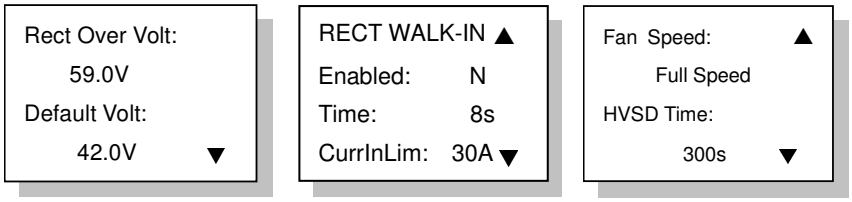
2. The value description of the parameters is listed below:

Table 4-12 DC setting parameter description

Parameter	Range	Default	Value description	
Over (over-voltage)	40V ~ 60V	58.5V	The "DC Over Voltage" alarm will be raised when the system DC output voltage is higher than the value of "Over"	The values of these three parameters should be: Over > Low > Under
Low (low-voltage)		45.0V	The DC low voltage alarm will be raised when the system DC output voltage is lower than the value of "Low"	
Under (under-voltage)		45.0V	The DC under voltage alarm will be raised when the system DC output voltage is lower than the value of "Under"	
High (high temperature)	10℃ ~ 100℃	40℃	The high temperature alarm will be raised when the detected ambient temperature is higher than the value of "High"	The value of parameter "High" must be higher than that of parameter "Low"
Low (low temperature)	-40℃ ~ 10℃	-5℃	The low temperature alarm will be raised when the detected ambient temperature is lower than the value of "Low"	
Load shunt	Y, None	None	Set according to the system actual situation	
Shunt Coeff	Dependent on system type		In the system with a load shunt, this parameter can be set only when the parameter "Shunt" (as a system type) is set to "Set"	

4.7.9 Rectifier Settings

1. There are three related pages, as shown below:



Use "▼" or "▲" to select one page or one of the parameters, and "◄" or "►" to select the parameter value. Press "ENT" to confirm and save.

2. The value description of the parameters is listed below:

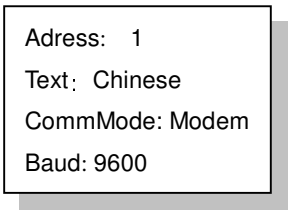
Table 4-13 DC rectifier parameter description

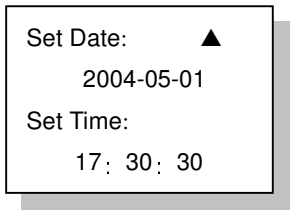
Parameter	Range	Default	Value description	
Rect Over Volt	56V ~ 59V	59V	The rectifier over voltage alarm will be raised when the rectifier output voltage is higher than the "Rect Over Volt"	The "Default Volt" must be lower than the "Rect Over Volt"
Default Volt	48V ~ 58V	53.5V	When the communication between the rectifier and the monitoring module is interrupted, the output voltage of the rectifier is the default voltage	
Walkin Enabled	Y, N	N	The output soft start function means the rectifier voltage will rise from 0V to the "Default Volt" after the "Walkin Time"	
Walkin Time	8s ~ 128s	8s		
Rectifier input current limit	1A ~ 50A	30A	The monitoring module limits the rectifier input current within the limit value	
Fan Speed	Full Speed, Half Speed	Half speed	When set to "Half Speed", the rectifier will regulate the fan speed according to the temperature. When set to "Full Speed", the fan will operate at full speed	
HVSD Time	50s ~ 300s	300s	The rectifier will shut off automatically upon over-voltage, and restart after a certain delay to see whether it is still over-voltage then. That delay is set through the parameter "HVSD Time". If the rectifier's output voltage is normal within the delay, the rectifier is regarded normal; otherwise, the rectifier will be locked out and auto-restart function will be disabled	

4.7.10 System Settings

Users of different password levels have different authorities.

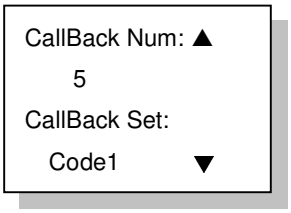
1. For the user level password (“1” by default), there are 2 related pages, as shown below:

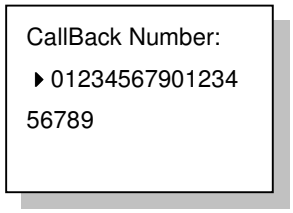




Use “▼” or “▲” to select one page or one of the parameters, and “◄” or “►” to select the parameter value. Press “ENT” to confirm and save.

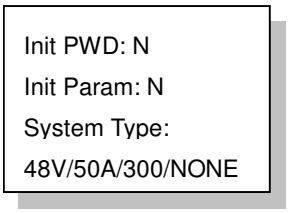
When the “CommMode” is “MODEM” or “EEM-M”, the “CallBack Number” and “CallBack Num” (how many times should callback be made) should be set.



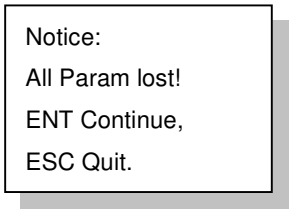


Use “▼” or “▲” to change the number, and “◄” or “►” to move the cursor left or right. Press “ENT” to confirm.

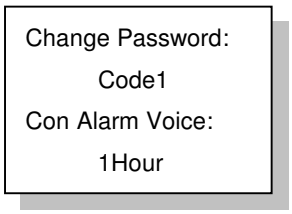
2. For the operator level password (by default: 2) or administrator level password (by default: 640275), you can see the following pages, besides the pages above, as shown below:

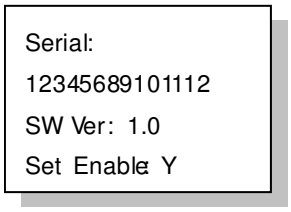


There will be a prompt when resetting the system:

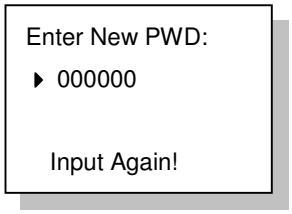


3. For administrator level password (by default: 640275), you can see the following pages, besides all those above, as shown below:





You can change the value of the parameter “Change Password” and press “ENT” to confirm.



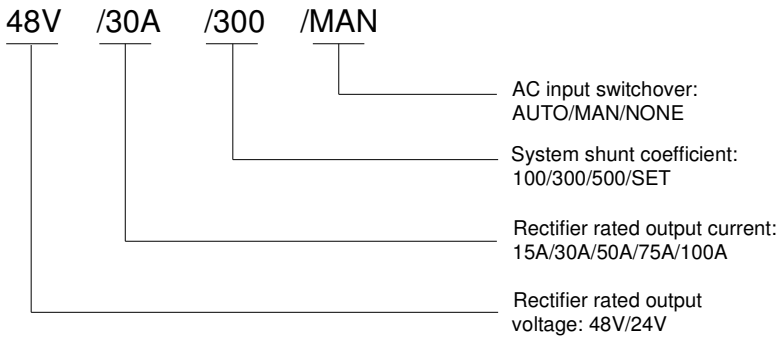
Use "▼" or "▲" to change the number, and "◄" or "►" to move the cursor left or right. Press "ENT" to confirm. You should input the same number twice to complete the setting.

4. The value description of the parameters is listed below:

Table 4-14 System setting parameter description

Parameter		Range	Default	Value description
Text		Chinese, English and Spanish	Chinese	Set according to your need
Address		1 ~ 254	1	The addresses of power systems that are at the same monitored office should be different
CommMode		MODEM, EEM-M, RS-232	RS-232	"MODEM": Through modem and based on the Telecom protocol. "EEM-M": Through modem and based on the EES protocol. "RS-232": Through a transparent serial port and based on the Telecom protocol
BaudRate		1200bps, 2400bps, 4800bps, 9600bps	9600bps	Make sure the baud rates of both the sending and receiving parties are the same
Set Date		2,000 ~ 2,099		Set the time according to the current actual time, regardless of whether it is a leap year or not
Set Time		Hour, min, sec		
Operator level or above	Init PWD (initialize password)	Y, N	N	Selecting "Y" can reset the user level and administrator level passwords to the defaults
	Init Param (initialize parameters)	Y, N	N	When the system parameters cannot be set normally, and the usual resetting methods do not work, you can set the "Init Param" to Y, and all the system parameters will be restored to defaults. Alarms may be raised for the defaults may fail to meet the actual situation. Set the parameters according to the actual situation then
Operator level or above	System Type		NetSure 501 A50: 48V/30A/SET/NONE; NetSure 701 A51 (PS48300-3A/3200): 48V/50A/300/ NONE; NetSure 701 A51 (PS48300-3A/3200-X2): 48V/50A/SET/NONE; NetSure 501 AA0: 48V/30A/300/NONE	This parameter has been set according to the actual situation upon delivery and needs not to be changed. However, when a new monitoring module is used, its "System Type" should be set according to the actual situation. After this parameter is changed, the monitoring module will restart automatically, and other parameters of the monitoring module will be changed to the defaults of the corresponding system type. You should change some parameters according to the actual situation
Administrator	Change Password	User, Operator, Admin		The password can be 6 digits long at most
	Con Alarm Voice	3min, 10min, 1h, 4h, constant	Contstant	The period that an alarm sound will last
	Serial	The production serial No. of the monitoring module. This parameter cannot be changed		
	SW Ver	The software version No. of the monitoring module. This parameter cannot be changed		
	Set Enable	Reflecting the jumper status of a hardware switch within the monitoring module. If this parameter is set to "N", you are not allowed to use the jumper, nor change any parameter except the battery management mode. The maintenance over the monitoring module will not be affected		

5. The model description is shown below:

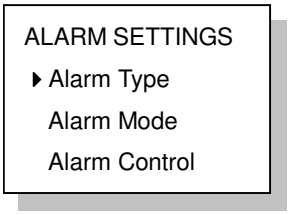


Note

Monitoring module M500D can monitor multiple power systems made by Emerson. If the system type is not set correctly, unpredictable faults may occur.

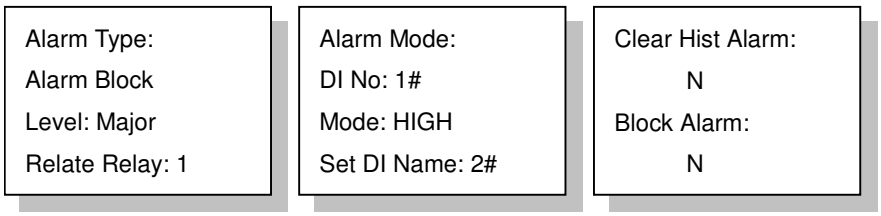
4.7.11 Alarm Settings

1. The first page of the setting interface is show below:



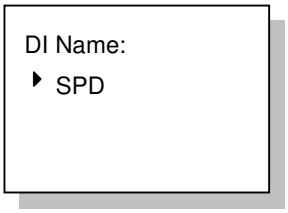
There are 3 submenus. Use "▼" or "▲" to select one, and use "ENT" to confirm.

2. The three submenus are shown below:



Use "▼" or "▲" to select one page or one of the parameters, and "◄" or "►" to select the parameter value. Press "ENT" to confirm and save.

3. After setting the "Set DI Name" and confirming it, the system will prompt you to name the DI:



Use "▼" or "▲" to change the number, and "◄" or "►" to move the cursor left or right. Press "ENT" to confirm.

4. The value description of the parameter is listed below:

Table 4-15 Alarm setting parameter description

Parameter	Range	Default	Value description	
Alarm Type	56 names of alarm events	Alarms of different types have different levels and different Relate Relays	Select those alarm events whose levels and relate relays should be reset	
Level	Critical, Major, Observation, None		There are different audible/visual alarm modes and callback modes for alarm events of different levels	
Relate Relay	Empty, No.1 ~ 8		"Empty": The corresponding dry contact will not output alarm information upon an alarm event "No. 1 ~ 8": There will be a dry contact in the range of No.1 ~ 8 that outputs the alarm information upon an alarm event	
DI No.	No. 1 ~ 8	1	The 8 corresponding connecting terminals, queued up in the order that the hardware switches are put	Effective only to self-defined DI alarms
Alarm Mode	High, Low	Low	"High": alarm upon high level; "Low": alarm upon low level. Set according to the actual situation	
Set DI Name	1# ~ 8#	1#	Serial No. of the connecting terminal for DI input	
DI Name	Figures or letters, 10 at most	SPD	When there are DI alarms, this parameter shows the alarm name you have actually defined. In the system with an AC sampling board, you can define by yourself the DIs of routes No.7 and No.8. In the system without an AC sampling board, you can define all DIs	
Clear His Alarm	Y, N	N	"Y": Delete historical alarms	
Block Alarm	Y, N	N	"Y": The active alarms will not be sent to the host (valid in EEM protocol)	

Chapter 5 Use Of Monitoring Module M800D

This chapter introduces the front panel and functional keys briefly, and expounds screen contents, access method, system controlling, information querying, parameter setting, access M800D through web and NMS, and parameter setting guidance.

5.1 Operation Panel

M800D Panel is illustrated in Figure 4-1:

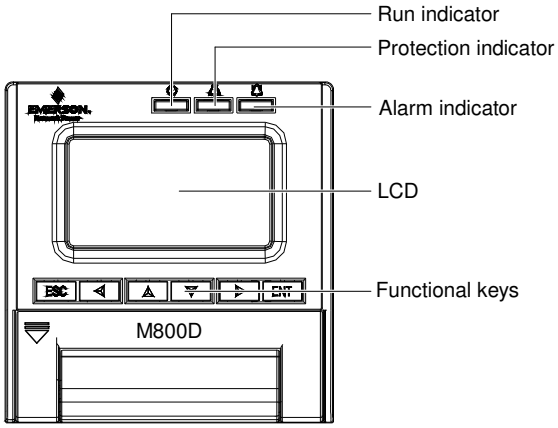


Figure 5-1 M800D panel

Functions of LED indicators are illustrated in Table 4-1.

Table 5-1 Functions of LED indicators

LED	Normal status	Abnormal status	Cause
Run Indicator (green)	On	Off	No power supply
Protection Indicator (yellow)	Off	On	The power system has at least an observation alarm
Alarm Indicator (red)	Off	On	The power system has at least a major alarm or critical alarm

M800D controller uses a 128 × 64 dot- matrix LCD unit. It has 6 functional keys. Its interface is easy-to-use and it supports multi-language (English, Chinese, French, Spanish, Portuguese, Italian and Swedish) display. The functions of these 6 keys are shown in Table 4-2:

Table 5-2 Functions of M800D keys

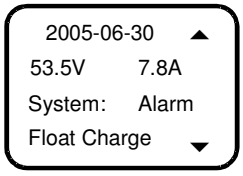
Keys	Name of keys	Functions	
ESC	Return Key	Press this key to back to previous menu or cancel a setting of a parameter	Press ESC and ENT together to reset M800D
ENT	Enter key	Press this key to go to next menu or highlight editable area for parameter setting, validate the change made to a parameter setting	
▲	Up	Press ▲ or ▼ to scroll through the menus	These four arrow keys can be used to change the value of a parameter: Press ▲ or ▼ to move the cursor to the parameter to be changed and press ◄ or ► to change the value of a parameter
▼	Down		
◄	Left	Change the edit value of a parameter. In main screen, press ◄ or ► to adjust the contrast of LCD	
►	Right		

5.2 Use Of The Operation Panel

The first screen is the language-selecting screen, as shown in the following figure. User can select English or other language in the screen by pressing ▲ and ▼, and press ENT to enter the main screen after selecting the language. If no key has been pressed for 30 seconds, user will enter the main screen directly.

5.2.1 Main Screen

The main screen is shown in the following figure.



The main screen displays system time, DC voltage, DC current, system status and battery status. The system time displays the date and time alternatively.

In the default main screen:

Press ◄ or ► to change the contrast of LCD

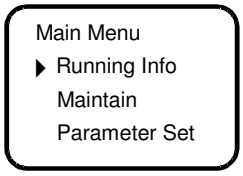
Press ▲ and ▼ and ESC together to log out (The password will be invalid)

Press ENT and ESC together to reset M800D

Press ENT to enter main menu

5.2.2 Main Menu

The main menu is the highest- level menu. The setting, controlling, information querying (rectifier information and alarm information) of all the parameters are carried out by the submenus of the main menu. The main menu is shown in the following figure.

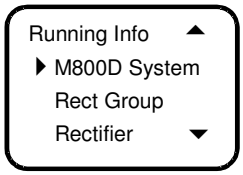


1. Press ENT in any screen of the main screen to enter main menu.
2. Press ESC in the submenu to return to the main screen step by step.

5.2.3 Running Information

1. Introduction to running info

In the screen of Main Menu, press ▲ or ▼ to select the sub-menu of “Running Info”, and press ENT to activate the menu to show the screen of “Running Info”:

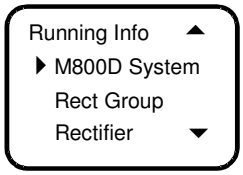


The running information includes Equipments information, Active alarm and History alarm. The equipment information displayed in the screen of “Running Info” is configurable. Press ▲or▼ to view more running information:

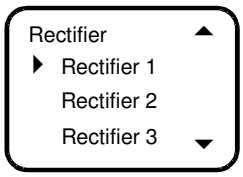
Press ▲ or ▼ to select the sub-menus in the screen of “Running Info”, and press ENT to activate the menu. For example, move the cursor to the sub-menu of “History Alarm”, and press ENT to view the history alarm. If there is no history alarm, following screen pops up:

2. Equipment information

If the equipment category has more than one piece of equipment, the detailed equipment information will be displayed in two-level menus. For example, the rectifier information is displayed in two-level menus, as shown below.

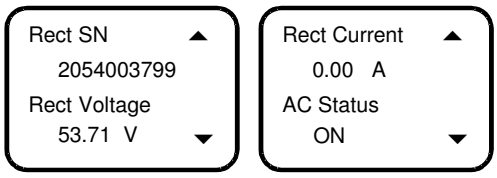


In the preceding screen, select the sub-menu of “Rectifier” and press ENT to display the first level:



In the preceding screen, select a rectifier, for example, select Rectifier1, and press ENT to display the detailed information (signals) of the rectifier:

The second-level of the rectifier information screen is shown in the following figures.

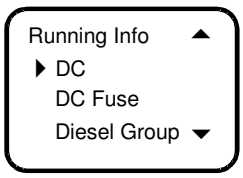


In the preceding screen, press ◄ or ► to view the information of other rectifiers such as rectifier2.

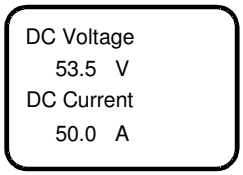
The detailed signals are configurable. Every piece of equipment has its own configuration file (text file) that includes all the information of the equipment signals. Modify the configuration file can change the equipment signals to be displayed in the screen.

If the equipment category has only one piece of equipment, the detailed information will only be displayed in a one-level menu.

For example, the signals of DC distribution unit are only displayed in one level:

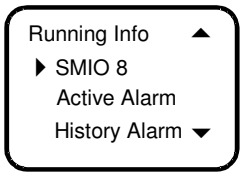


In above screen, select DC and press ENT to display the detailed information (signals) of the DC distribution unit:

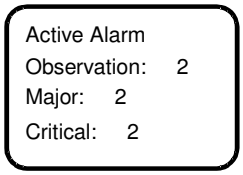


3. Alarm information

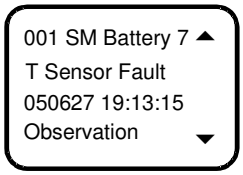
In the screen of “Running Info”, press ▲ or ▼ to select the sub-menu of Active Alarm:



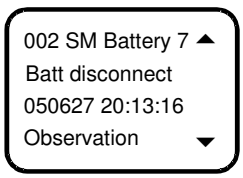
Press ENT to activate the menu of “Active Alarm”, the following screen pops up if the DC power has active alarms:



In the preceding screen, press ENT to view the detailed alarm information and one screen only displays one alarm:

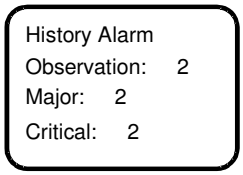


In the preceding screen, “001” is the alarm sequence number, and “050627 19:13:16” is the time when the alarm occurs. Press ▲ or ▼ to view other alarms.

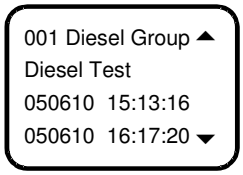


If there is no alarm, following screen pops up:

In the screen of “Running Info”, press ▲ or ▼ to select the sub-menu of History Alarm and press ENT to activate the menu, the following screen pops up if the DC power has history alarms:



In the preceding screen, press ENT to view the detailed history alarm information and one screen only displays one alarm:



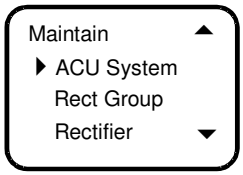
In the preceding screen, “050610 15:13:16” is the start time of the alarm and “050610 16:17:20” is the end time of the alarm.

5.2.4 Maintain

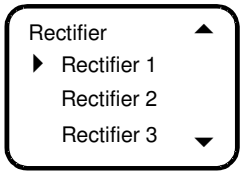
In the screen of Main Menu, press ▲ or ▼ to select the sub-menu of “Maintain”, and press ENT to activate the menu, following screen pops up:

If the user has selected the user (default user: “admin”) and entered the password (default password: “1”) to set the parameters, and if the user and password are still active, he can directly implement the “Maintain” operation. Otherwise he has to select the user and enter the password again. See *5.3.6 Settings* for the methods of selecting of user and password entry.

The Maintain screen is shown as follows:

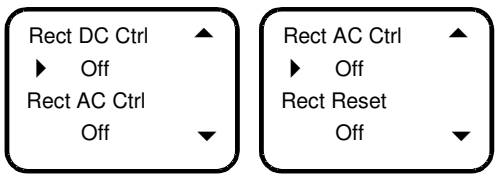


If the equipment category has more than one piece of equipment, the detailed equipment information will be displayed in two-level menus. For example, the rectifier information is displayed in two-level menus. In the preceding screen, select the sub-menu of “Rectifier” and press ENT to display the first level:



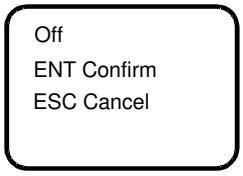
In the preceding screen, select a rectifier, for example, select Rectifier1, and press ENT to display the detailed information (signals) of the rectifier:

Second-level:



Control Method:

With control method of “Rect AC Ctl” as an example, press ▲ or ▼ to move the cursor to the setting of “Rect AC Ctl”, and press ENT. At this point, this row is highlighted which indicates user can modify the setting. User can change the setting from “off” to “On” by pressing ◄ or ►. After setting, press ENT, following pops up:



If user presses ENT, the control operation is implemented.

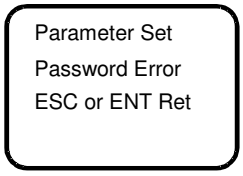
In the preceding screen, press ◄ or ► to implement the control of other rectifiers such as rectifier2.

5.2.5 Parameter Set

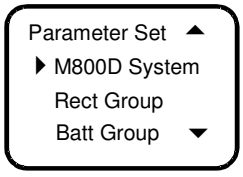
In the screen of Main Menu, press ▲ or ▼ to select the sub-menu of “Parameter Set”, and press ENT to activate the menu, following screen pops up:

Before setting the parameters, select user first because different users have different authorities. To select the user, press ▲ or ▼ to move the cursor to the second row, press ENT to highlight editable area and then press ◄ or ►to select the user, and finally press ENT again to validate the selection.

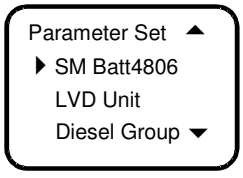
After selecting the user, press ▲ or ▼ to move the cursor to the last row and press ENT to begin typing the password. At this point, the last row is highlighted, which indicates that the controller is ready for password entry. When typing the password, press ▲ or ▼ to select the character and press ◄ or ► to move from digit to digit. Letters, numbers, upper case and lower case of the letters are available for the password. If no key has been pressed for 4 minutes, the controller will require the user to enter the password again. If the password entered is wrong, following screen pops up:



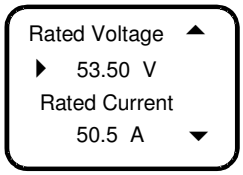
Enter the correct user name and password to access the screens of Parameter Set.



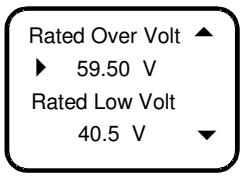
Press ▲ or ▼ to view more screens of “Parameter Set”.



In above screen, press ▲ or ▼ to select the menu of “Rect Group” and press ENT to view the settable parameters of the rectifier: For example:



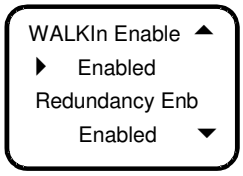
The settable parameters of the rectifier are displayed in one more screen. Press ▲ or ▼ to scroll through the screens:



Method of configuring the parameters

With the “Rect Over Volt” configuring as an example, press ▲ or ▼ to move the cursor to the value of “Rect Over Volt” (59.50V) and press ENT to highlight the row. Press ◄ or ► to change the value. The change step of the value is configurable. After modifying the parameter, press ENT to validate the modification.

Method of configuring the status

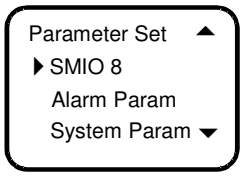


With “WALKIn Enable” as an example, press ▲ or ▼ to move the cursor to the value of “WALKIn Enable” and press ENT to highlight the row. Press ◄ or ► to change the value (from “Enable” to “Disable”, or from “Disable” to “Enable”).

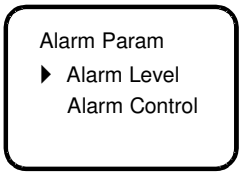
If the equipment category has more than one piece of equipment, the detailed settable parameters of the equipment are displayed in two-level menus. Press ◄ or ► to view the information of other equipment that belongs to the equipment category.

Alarm parameter setting

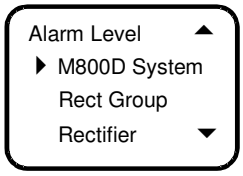
The alarm parameter setting screen is shown in the following figure.



In the preceding screen, press ▲ or ▼ to move the cursor to the menu of “Alarm Param” and press ENT, the following screen pops up:



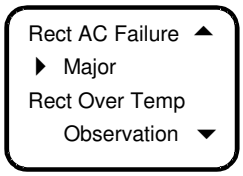
In the preceding screen, press ▲ or ▼ to move the cursor to the menu of “Alarm Level” and press ENT, the following screen pops up to allow the user to set the alarm level:



Method of setting the alarm level:

With the alarm level setting of “Rectifier” as an example:

In the preceding screen, press ▲ or ▼ to move the cursor to the menu of “Rectifier” and press ENT, following screen pops up:

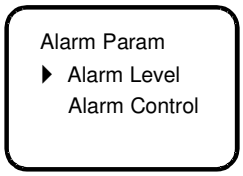


The above screen displays the alarm information of the rectifier. The information is configurable. The alarm information is displayed in several screens, user can press ▲ or ▼ to scroll through the screens to view the alarm information.

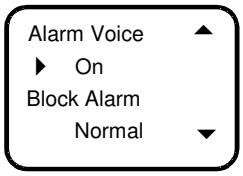
If user wants to change the alarm level of “Rectifier AC Failure” from “Major” to “Critical”, press ▲ or ▼ to move the cursor to the setting of “Rectifier AC Failure”, and press ENT. At this point, this row is highlighted which indicates user can modify the setting. User can select the alarm level of “Critical” by pressing ◄ or ►.

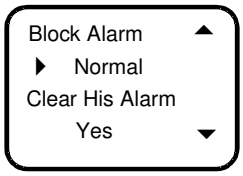
Method of setting alarm control:

The Alarm parameter setting is shown in the following figure.



In the preceding screen, press ▲ or ▼ to move the cursor to the menu of “Alarm Control” and press ENT, following screen pops up:



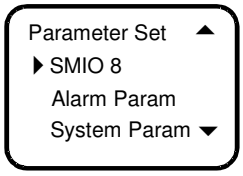


Similar to modifying the alarm level, user can modify the setting of “Alarm Voice” from “On” to “Off”,”3 Min”, “10 Min”, ”1 Hour”, or ”4 Hour”.

User can also modify the setting of “Block Alarm” from “Normal” to “Blocked” or from “Blocked” to “Normal” by using the same method.

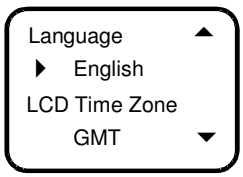
If user executes the setting “Yes” of “Clear His Alarm” (Note: For “Clear His Alarm”, there is only one option of ”Yes”, and there is no option of ”No”), all the history alarm will be cleared.

System parameters setting

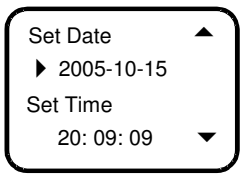


In the preceding screen, move the cursor “→” to “System Param”, and then press ENT to set the system information (parameters).

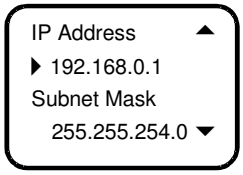
System information is displayed in following screens:

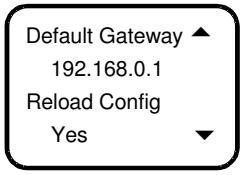


M800D supports 2 languages, one is English and another is the local language, which are configurable through above screen. LCD Time Zone support the selection from GMT-12:00 to GMT+13:00. User can select the language in the preceding screen.



In the preceding screen, user can set the date and time. For example, move the cursor "→" to "2005-10-15", press ENT to highlight the date, and then press ◄ or ► to change the date, after changing the date, press ENT to validate the change.

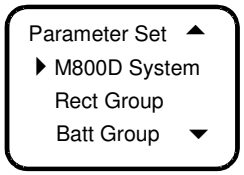




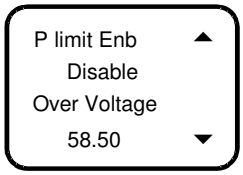
M800D supports time setting and network function. User can modify the M800D IP address and Subnet mask to allow other computers can access the M800D through IE, NMS and HLMS.

Power limit setting

Enter the parameter setting interface:



In the above interface, select "M800D System" and continue to press ▲ or ▼to show the screen of power limit function as show below:



Note: User can set the power limit function to "enable" or "disable". If the power limit function is set to be "Disable", the diesel generator will not be controlled by M800D and has to be controlled manually.

5.3 Access M800D Through Web

5.3.1 Overview Of Web Function

Web is a remote user interface, the user can

- Browse the detailed status of each piece of equipment such as rectifiers, batteries, and AC unit.
- Send control commands and set parameters to equipment.
- View the active alarms that can be automatically popped up if a new alarm comes.
- Query historical alarms, historical signal data and logs (battery test, diesel test, user control, system).
- Change system parameters, such as IP address, time, SNMP and EEM protocol settings, user information.
- Change equipment name, signal name and alarm level.
- Download and upload configuration files, and update application software and local language package.

5.3.2 Login

To log in M800D, double-click the icon of IE to run the software, click the menus of Tools→Internet Options and then click the button "Connections" to pop up the following screen:

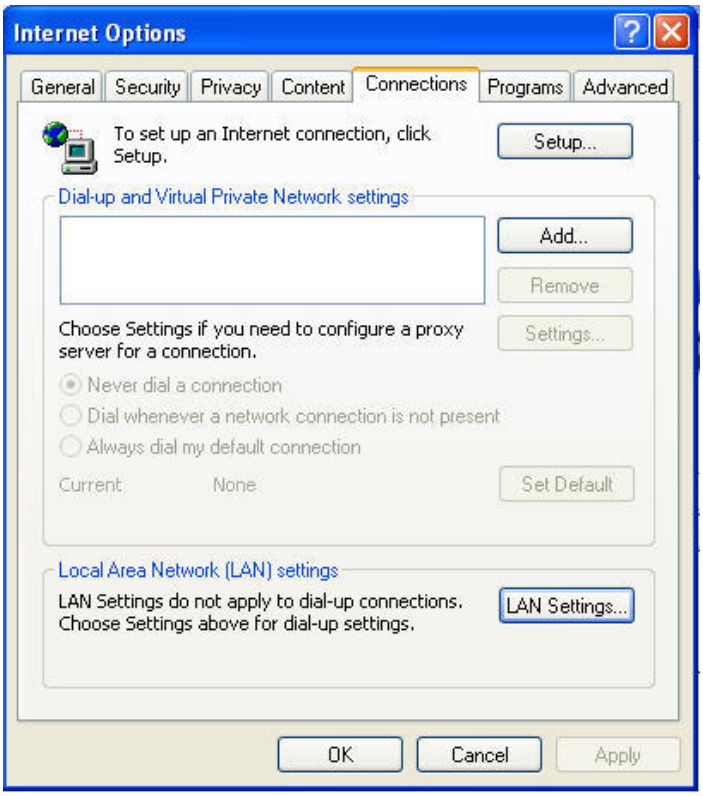


Figure 5-2 LAN setting (step 1)

In the screen shown in Figure 4-2, click the button “LAN Settings” to pop up the following screen:

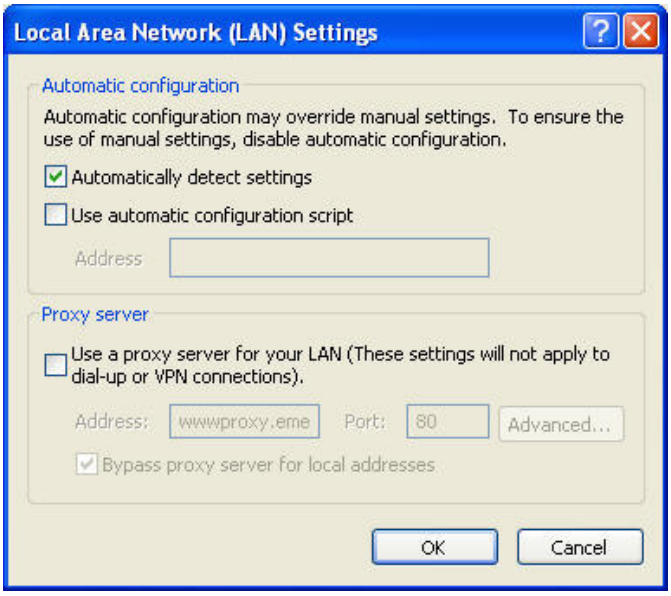


Figure 5-3 LAN setting (step 2)

In the preceding screen, uncheck the proxy screen and click OK to finish the LAN setting. Then input the IP address and press ENT, the following Web interface pops up requiring user to enter user name and password.

Note that the user needs to do the above settings only when the M800D is connected to an intranet and the user has set that the access to the intranet must be made through proxy. If the M800D is connected to Internet and the user computer is connected to the intranet, the user cannot disable the proxy, otherwise he cannot access the M800D.

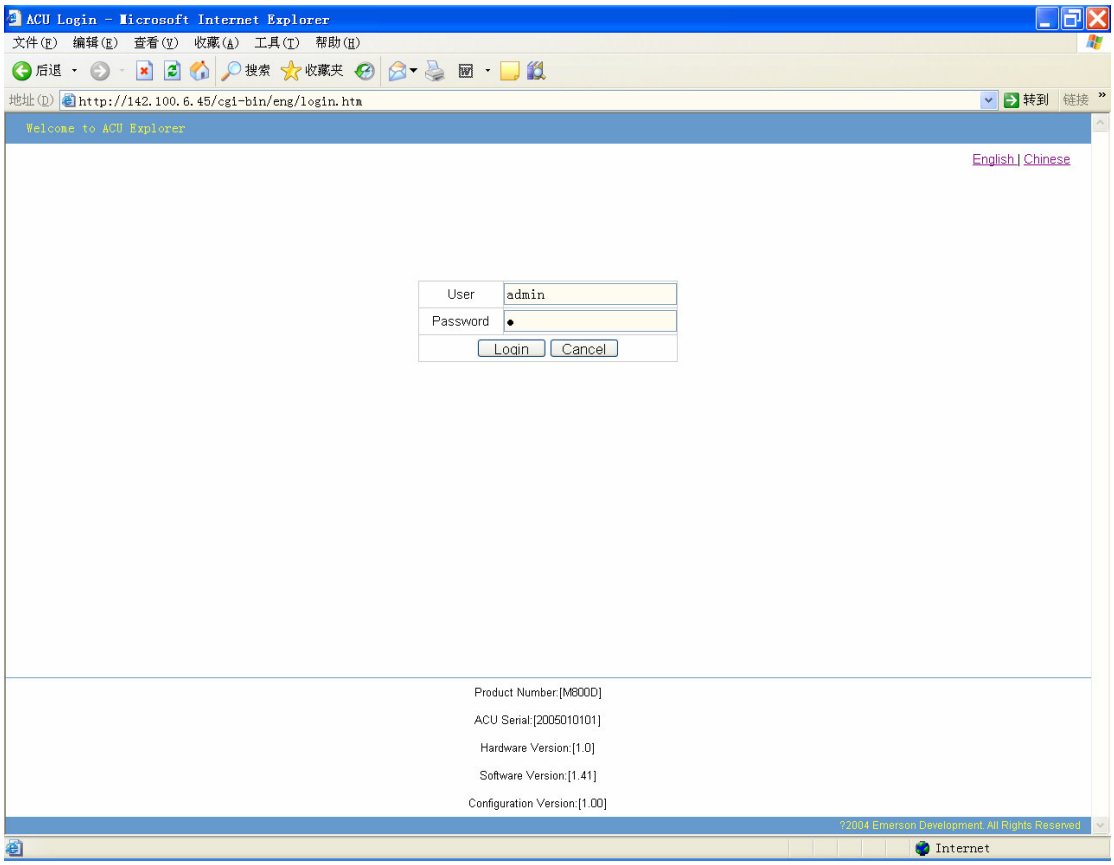


Figure 5-4 Log in M800D

In the preceding screen, enter the user name (default user name: “admin”) and password (default password: “1”) to log in M800D, and the homepage screen as shown in Figure 4-4 pops up.

5.3.3 Homepage Introduction

The homepage screen is shown in Figure 4-5.

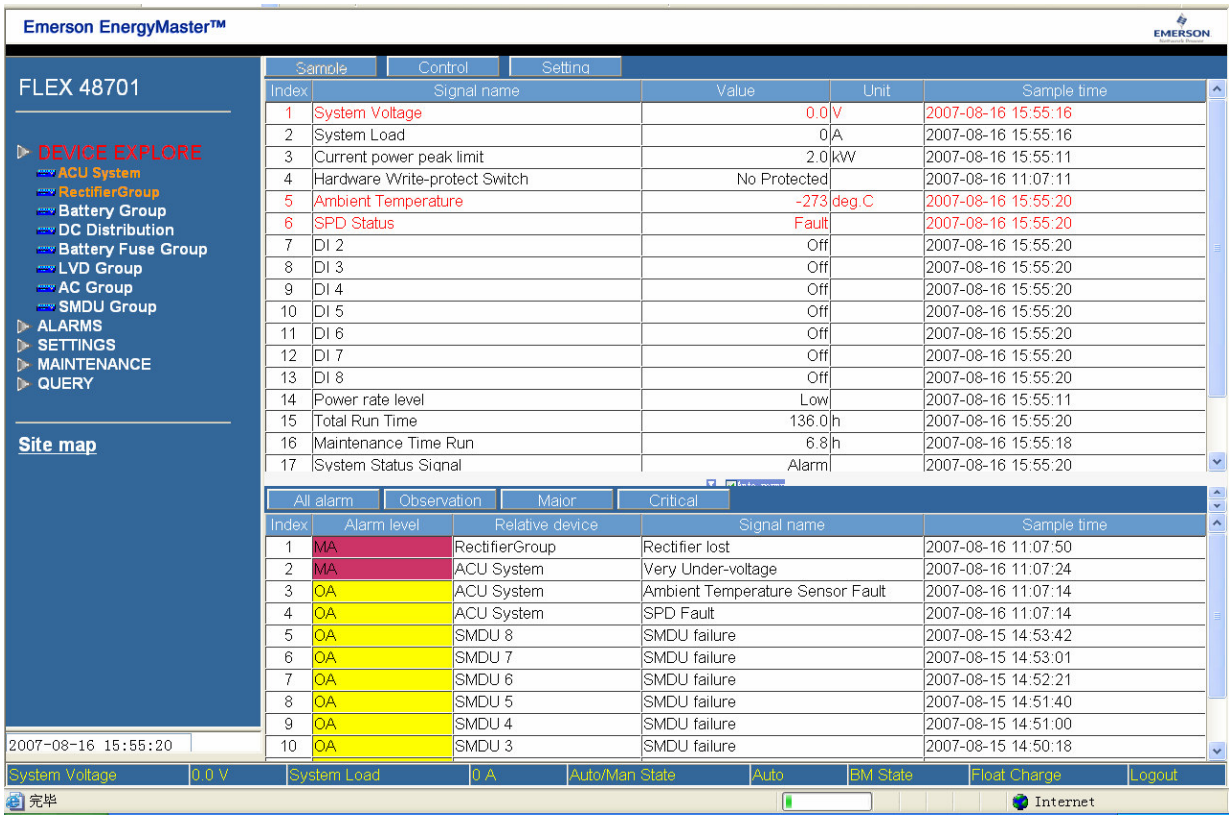

Emerson EnergyMaster™
EMERSON
FLEX 48701
DEVICE EXPLORE
ACU System
RectifierGroup
Battery Group
DC Distribution
Battery Fuse Group
LVD Group
AC Group
SMDU Group
ALARMS
SETTINGS
MAINTENANCE
QUERY
Site map
2007-08-16 15:55:20
Sample
Control
Setting
Index Signal name Value Unit Sample time
1 System Voltage 0.0 V 2007-08-16 15:55:16
2 System Load 0 A 2007-08-16 15:55:16
3 Current power peak limit 2.0 kW 2007-08-16 15:55:11
4 Hardware Write-protect Switch No Protected 2007-08-16 11:07:11
5 Ambient Temperature -273 deg.C 2007-08-16 15:55:20
6 SPD Status Fault 2007-08-16 15:55:20
7 DI 2 Off 2007-08-16 15:55:20
8 DI 3 Off 2007-08-16 15:55:20
9 DI 4 Off 2007-08-16 15:55:20
10 DI 5 Off 2007-08-16 15:55:20
11 DI 6 Off 2007-08-16 15:55:20
12 DI 7 Off 2007-08-16 15:55:20
13 DI 8 Off 2007-08-16 15:55:20
14 Power rate level Low 2007-08-16 15:55:11
15 Total Run Time 136.0 h 2007-08-16 15:55:20
16 Maintenance Time Run 6.8 h 2007-08-16 15:55:18
17 System Status Signal Alarm 2007-08-16 15:55:20
All alarm
Observation
Major
Critical
Index Alarm level Relative device Signal name Sample time
1 MA RectifierGroup Rectifier lost 2007-08-16 11:07:50
2 MA ACU System Very Under-voltage 2007-08-16 11:07:24
3 OA ACU System Ambient Temperature Sensor Fault 2007-08-16 11:07:14
4 OA ACU System SPD Fault 2007-08-16 11:07:14
5 OA SMDU 8 SMDU failure 2007-08-15 14:53:42
6 OA SMDU 7 SMDU failure 2007-08-15 14:53:01
7 OA SMDU 6 SMDU failure 2007-08-15 14:52:21
8 OA SMDU 5 SMDU failure 2007-08-15 14:51:40
9 OA SMDU 4 SMDU failure 2007-08-15 14:51:00
10 OA SMDU 3 SMDU failure 2007-08-15 14:50:18
System Voltage 0.0 V System Load 0 A Auto/Man State Auto BM State Float Charge Logout
完毕
Internet

Figure 5-5 M800D homepage

In the Homepage screen, the left part displays the user name, the login time, the menus of “Device explore”, “Alarms”, “Settings”, “Maintenance”, “Query data” and “Site map”. The alarm bar is displayed at the bottom of the screen.

5.3.4 Device Explore

As shown in Figure 4-5, the menu “Device explore” has the sub-menus of equipment groups such as “RectifierGroup”, “BatteryGroup”, “DC Distribution”, “Battery Fuse Group”, “AC Group”, “Diesel Group”, “Main Switch”, “SM IO” and “LVD Group”. User can check the sample data of the equipment, set the equipment parameter and control the equipment by operating these sub-menus.

Every piece of equipment has 3 signals that are data acquisition signals (sampled values), control signal and setting signal.

The following part introduces the device explore operation with rectifier and battery as examples.

Data browse, control and parameter setting of rectifier

1. Rectifier group

In the screen shown in Figure 4-6, click “RectifierGroup”, following screen pops up:

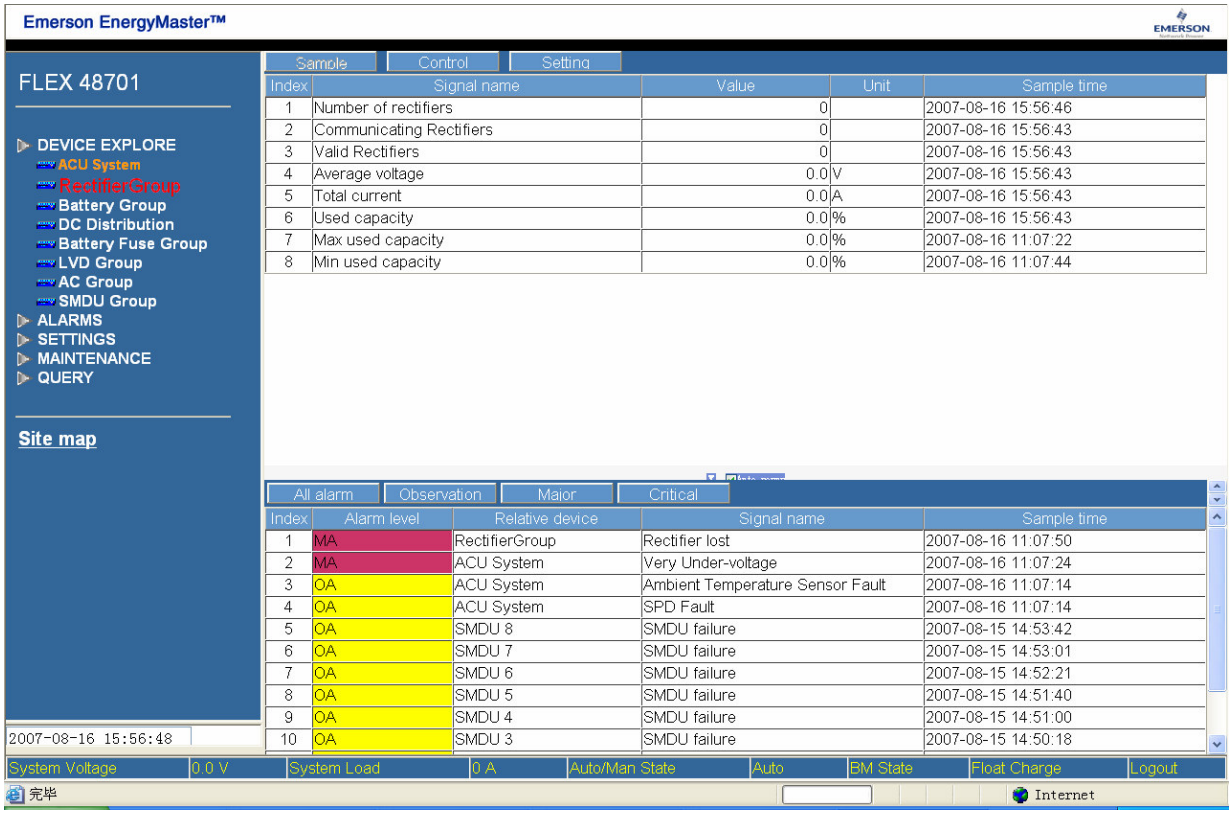

Emerson EnergyMaster™
EMERSON
FLEX 48701
DEVICE EXPLORE
ACU System
RectifierGroup
Battery Group
DC Distribution
Battery Fuse Group
LVD Group
AC Group
SMDU Group
ALARMS
SETTINGS
MAINTENANCE
QUERY
Site map
Sample
Control
Setting
Index Signal name Value Unit Sample time
1 Number of rectifiers 0 2007-08-16 15:56:46
2 Communicating Rectifiers 0 2007-08-16 15:56:43
3 Valid Rectifiers 0 2007-08-16 15:56:43
4 Average voltage 0.0 V 2007-08-16 15:56:43
5 Total current 0.0 A 2007-08-16 15:56:43
6 Used capacity 0.0 % 2007-08-16 15:56:43
7 Max used capacity 0.0 % 2007-08-16 11:07:22
8 Min used capacity 0.0 % 2007-08-16 11:07:44
All alarm
Observation
Major
Critical
Index Alarm level Relative device Signal name Sample time
1 MA RectifierGroup Rectifier lost 2007-08-16 11:07:50
2 MA ACU System Very Under-voltage 2007-08-16 11:07:24
3 OA ACU System Ambient Temperature Sensor Fault 2007-08-16 11:07:14
4 OA ACU System SPD Fault 2007-08-16 11:07:14
5 OA SMDU 8 SMDU failure 2007-08-15 14:53:42
6 OA SMDU 7 SMDU failure 2007-08-15 14:53:01
7 OA SMDU 6 SMDU failure 2007-08-15 14:52:21
8 OA SMDU 5 SMDU failure 2007-08-15 14:51:40
9 OA SMDU 4 SMDU failure 2007-08-15 14:51:00
10 OA SMDU 3 SMDU failure 2007-08-15 14:50:18
2007-08-16 15:56:48
System Voltage 0.0 V System Load 0 A Auto/Man State Auto BM State Float Charge Logout
完毕
Internet

Figure 5-6 Rectifier screen 1

The signals in the screen shown in Figure 4-6 are all the actually sampled values such as “Total current”, “Average voltage” and so on. In the screen, click the button “Control”, and the following screen pops up:

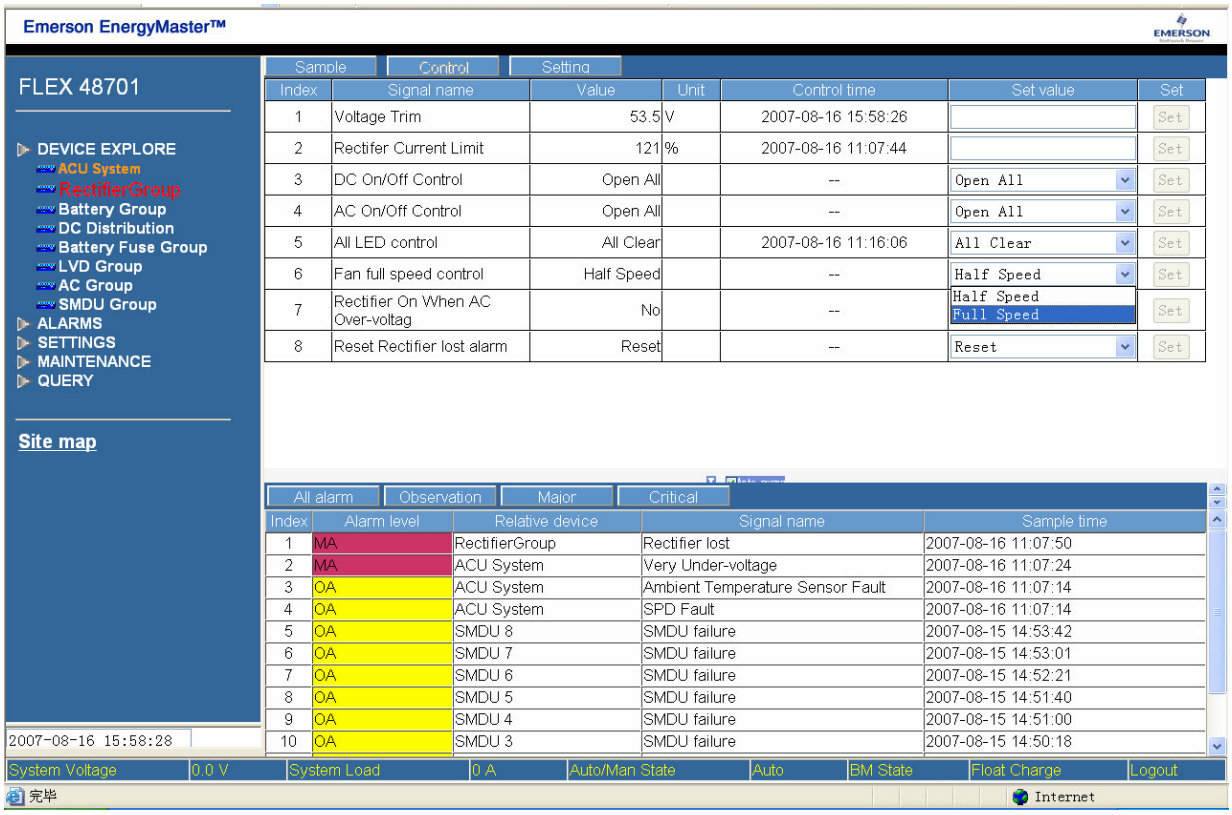

Emerson EnergyMaster™
EMERSON
FLEX 48701
DEVICE EXPLORE
ACU System
RectifierGroup
Battery Group
DC Distribution
Battery Fuse Group
LVD Group
AC Group
SMDU Group
ALARMS
SETTINGS
MAINTENANCE
QUERY
Site map
Sample
Control
Setting
Index Signal name Value Unit Control time Set value Set
1 Voltage Trim 53.5 V 2007-08-16 15:58:26 Set
2 Rectifer Current Limit 121 % 2007-08-16 11:07:44 Set
3 DC On/Off Control Open All -- Open All Set
4 AC On/Off Control Open All -- Open All Set
5 All LED control All Clear 2007-08-16 11:16:06 All Clear Set
6 Fan full speed control Half Speed -- Half Speed Set
7 Rectifier On When AC Over-voltag No -- Half Speed Full Speed Set
8 Reset Rectifier lost alarm Reset -- Reset Set
All alarm
Observation
Major
Critical
Index Alarm level Relative device Signal name Sample time
1 MA RectifierGroup Rectifier lost 2007-08-16 11:07:50
2 MA ACU System Very Under-voltage 2007-08-16 11:07:24
3 OA ACU System Ambient Temperature Sensor Fault 2007-08-16 11:07:14
4 OA ACU System SPD Fault 2007-08-16 11:07:14
5 OA SMDU 8 SMDU failure 2007-08-15 14:53:42
6 OA SMDU 7 SMDU failure 2007-08-15 14:53:01
7 OA SMDU 6 SMDU failure 2007-08-15 14:52:21
8 OA SMDU 5 SMDU failure 2007-08-15 14:51:40
9 OA SMDU 4 SMDU failure 2007-08-15 14:51:00
10 OA SMDU 3 SMDU failure 2007-08-15 14:50:18
2007-08-16 15:58:28
System Voltage 0.0 V System Load 0 A Auto/Man State Auto BM State Float Charge Logout
完毕
Internet

Figure 5-7 Rectifier screen 2

The signals in the screen shown in Figure 4-7 are all the values used to control the rectifier. For example, in “Fan full speed control”, user can select “Full Speed” and click “Set” to make the rectifier fan run at full speed. The control command is effective for all the rectifiers. Pay attention that the “Control” button is only active when the M800D is in

manual status. Therefore, before implementing the “Control” operation, the user have to set the “Auto/Man State” of the M800D System to “Man” status.

Click the button “Setting”, following screen pops up:

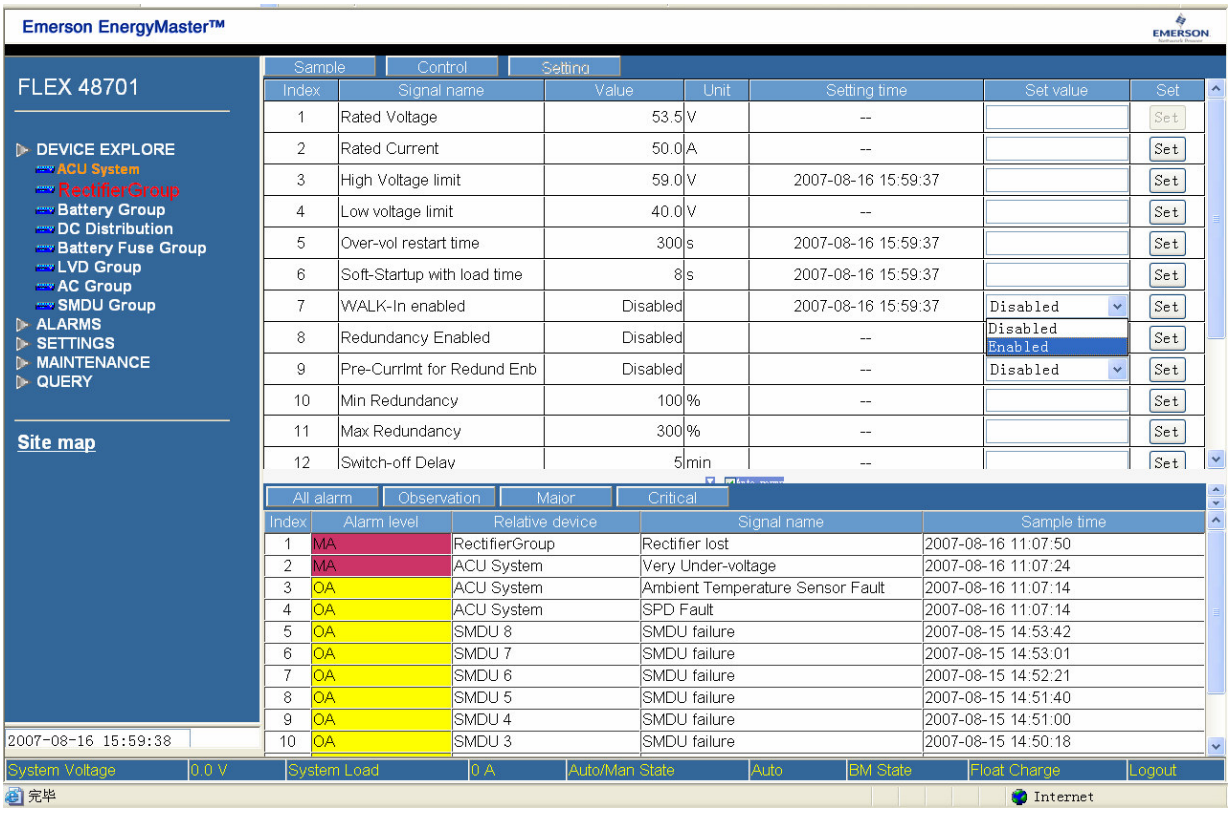

Emerson EnergyMaster™
EMERSON
FLEX 48701
DEVICE EXPLORE
ACU System
RectifierGroup
Battery Group
DC Distribution
Battery Fuse Group
LVD Group
AC Group
SMDU Group
ALARMS
SETTINGS
MAINTENANCE
QUERY
Site map
Sample
Control
Setting
Index | Signal name | Value | Unit | Setting time | Set value | Set
1 | Rated Voltage | 53.5 | V | -- | | Set
2 | Rated Current | 50.0 | A | -- | | Set
3 | High Voltage limit | 59.0 | V | 2007-08-16 15:59:37 | | Set
4 | Low voltage limit | 40.0 | V | -- | | Set
5 | Over-vol restart time | 300 | s | 2007-08-16 15:59:37 | | Set
6 | Soft-Startup with load time | 8 | s | 2007-08-16 15:59:37 | | Set
7 | WALK-In enabled | Disabled | | 2007-08-16 15:59:37 | Disabled | Set
8 | Redundancy Enabled | Disabled | | -- | Disabled / Enabled | Set
9 | Pre-CurrImt for Redund Enb | Disabled | | -- | Disabled | Set
10 | Min Redundancy | 100 | % | -- | | Set
11 | Max Redundancy | 300 | % | -- | | Set
12 | Switch-off Delay | 5 | min | -- | | Set
All alarm
Observation
Major
Critical
Index | Alarm level | Relative device | Signal name | Sample time
1 | MA | RectifierGroup | Rectifier lost | 2007-08-16 11:07:50
2 | MA | ACU System | Very Under-voltage | 2007-08-16 11:07:24
3 | OA | ACU System | Ambient Temperature Sensor Fault | 2007-08-16 11:07:14
4 | OA | ACU System | SPD Fault | 2007-08-16 11:07:14
5 | OA | SMDU 8 | SMDU failure | 2007-08-15 14:53:42
6 | OA | SMDU 7 | SMDU failure | 2007-08-15 14:53:01
7 | OA | SMDU 6 | SMDU failure | 2007-08-15 14:52:21
8 | OA | SMDU 5 | SMDU failure | 2007-08-15 14:51:40
9 | OA | SMDU 4 | SMDU failure | 2007-08-15 14:51:00
10 | OA | SMDU 3 | SMDU failure | 2007-08-15 14:50:18
2007-08-16 15:59:38
System Voltage | 0.0 V | System Load | 0 A | Auto/Man State | Auto | BM State | Float Charge | Logout
完毕
Internet

Figure 5-8 Rectifier screen 3

The screen shown in Figure 4-8 lists all the values that can be set. For example, user can select “Disabled” for the value of “Walk-in enabled” in the box of “Set value”, and then click the button “Set” to make the setting effective. After the setting, the walk-in function of all the rectifiers is disabled.

2. Single rectifier

Click the submenu “Rectifier1” of “RectifierGroup”, following screen pops up as shown in Figure 4-9:

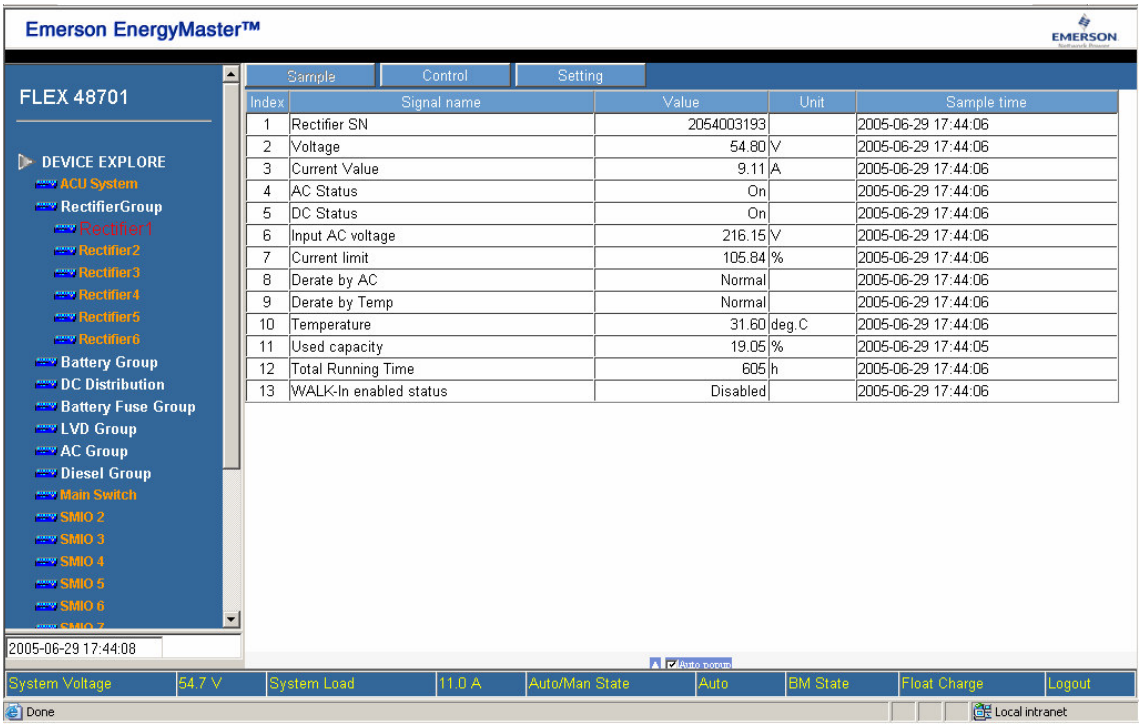

Emerson EnergyMaster™
EMERSON
FLEX 48701
DEVICE EXPLORE
ACU System
RectifierGroup
Rectifier1
Rectifier2
Rectifier3
Rectifier4
Rectifier5
Rectifier6
Battery Group
DC Distribution
Battery Fuse Group
LVD Group
AC Group
Diesel Group
Main Switch
SMIO 2
SMIO 3
SMIO 4
SMIO 5
SMIO 6
Sample
Control
Setting
Index | Signal name | Value | Unit | Sample time
1 | Rectifier SN | 2054003193 | | 2005-06-29 17:44:06
2 | Voltage | 54.80 | V | 2005-06-29 17:44:06
3 | Current Value | 9.11 | A | 2005-06-29 17:44:06
4 | AC Status | On | | 2005-06-29 17:44:06
5 | DC Status | On | | 2005-06-29 17:44:06
6 | Input AC voltage | 216.15 | V | 2005-06-29 17:44:06
7 | Current limit | 105.84 | % | 2005-06-29 17:44:06
8 | Derate by AC | Normal | | 2005-06-29 17:44:06
9 | Derate by Temp | Normal | | 2005-06-29 17:44:06
10 | Temperature | 31.60 | deg.C | 2005-06-29 17:44:06
11 | Used capacity | 19.05 | % | 2005-06-29 17:44:05
12 | Total Running Time | 605 | h | 2005-06-29 17:44:06
13 | WALK-In enabled status | Disabled | | 2005-06-29 17:44:06
2005-06-29 17:44:08
System Voltage | 54.7 V | System Load | 11.0 A | Auto/Man State | Auto | BM State | Float Charge | Logout
Done
Local intranet

Figure 5-9 Sampled values of single rectifier

The screen shown in Figure 4-9 shows the sample value of “Rectifier1”, similar to the operation of “RectifierGroup”, the user can click the button “Control” to view the values of rectifier 1 that can be controlled, as shown in Figure 4-10.

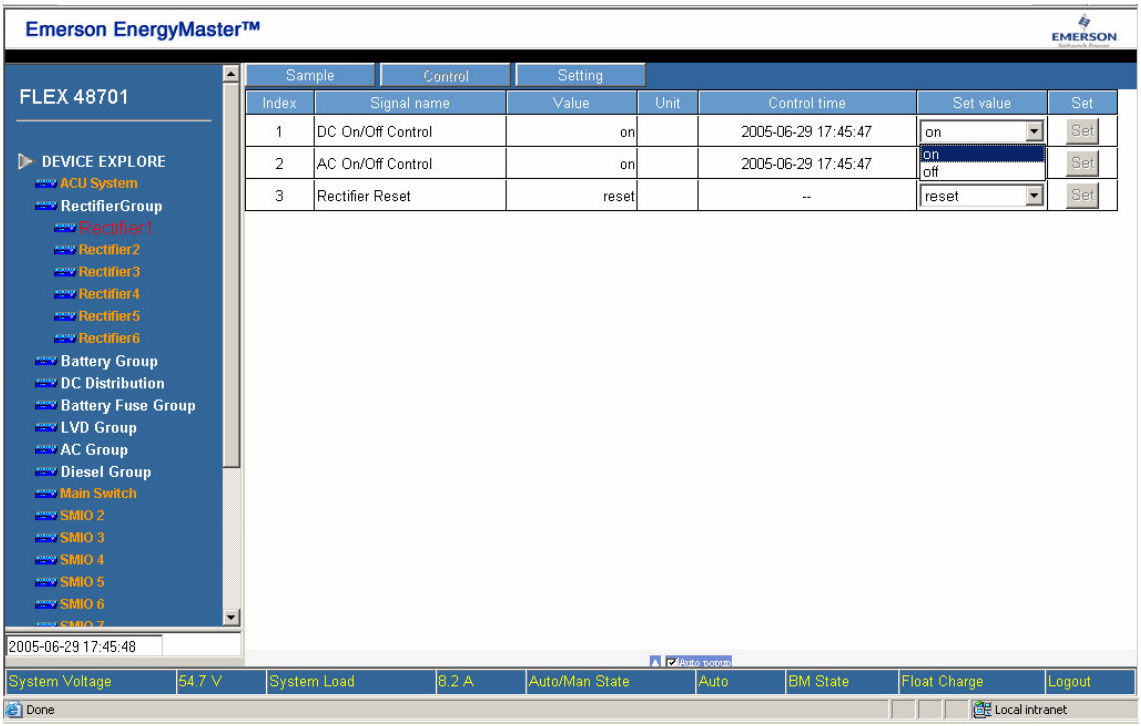


Figure 5-10 Control screen of rectifier 1

In the screen shown in Figure 4-10, the user can control rectifier 1. For example, the user can set the AC input of rectifier 1 to “on”.

Data browse, control and parameter setting of battery

Click the icon in the left of “BatteryGroup”, all the sampled values of the battery group are displayed as shown in Figure 4-11.

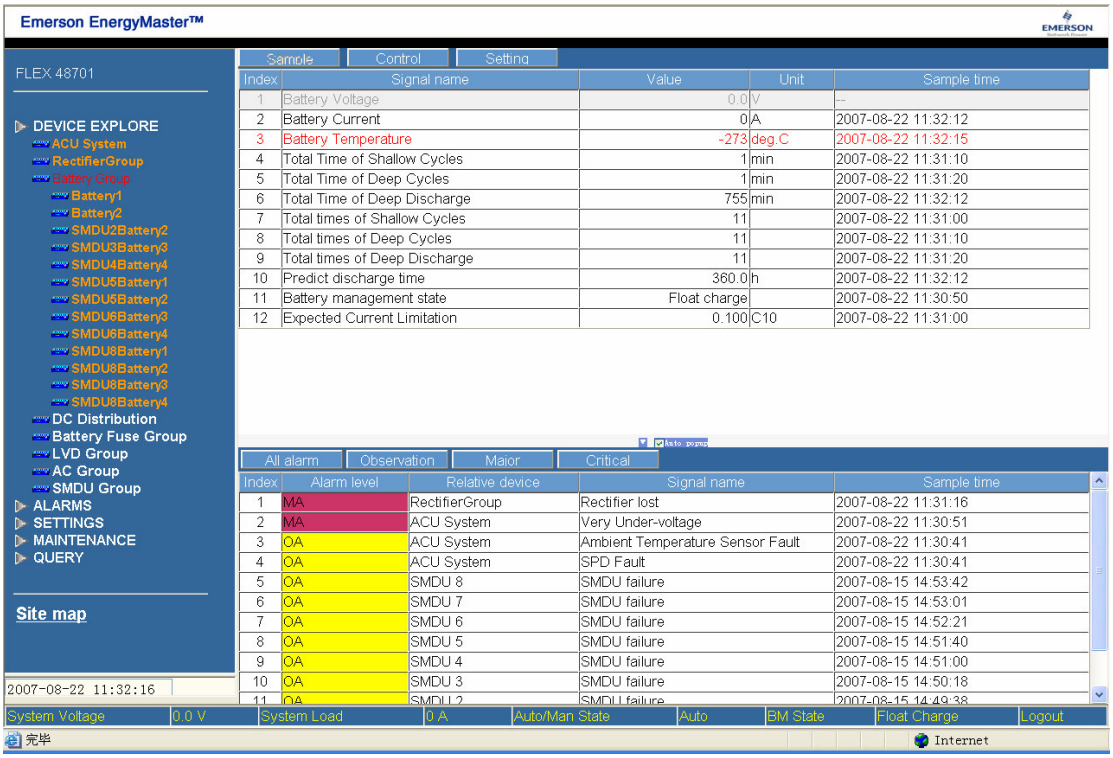


Figure 5-11 Battery screen (sampled value of battery)

In Figure 4-11, the battery voltage is the total battery string voltage. The battery current is the total battery current. Similar to browse the control values of the rectifier, click the button “Control” to view the control signals of the battery as shown in Figure 4-12.

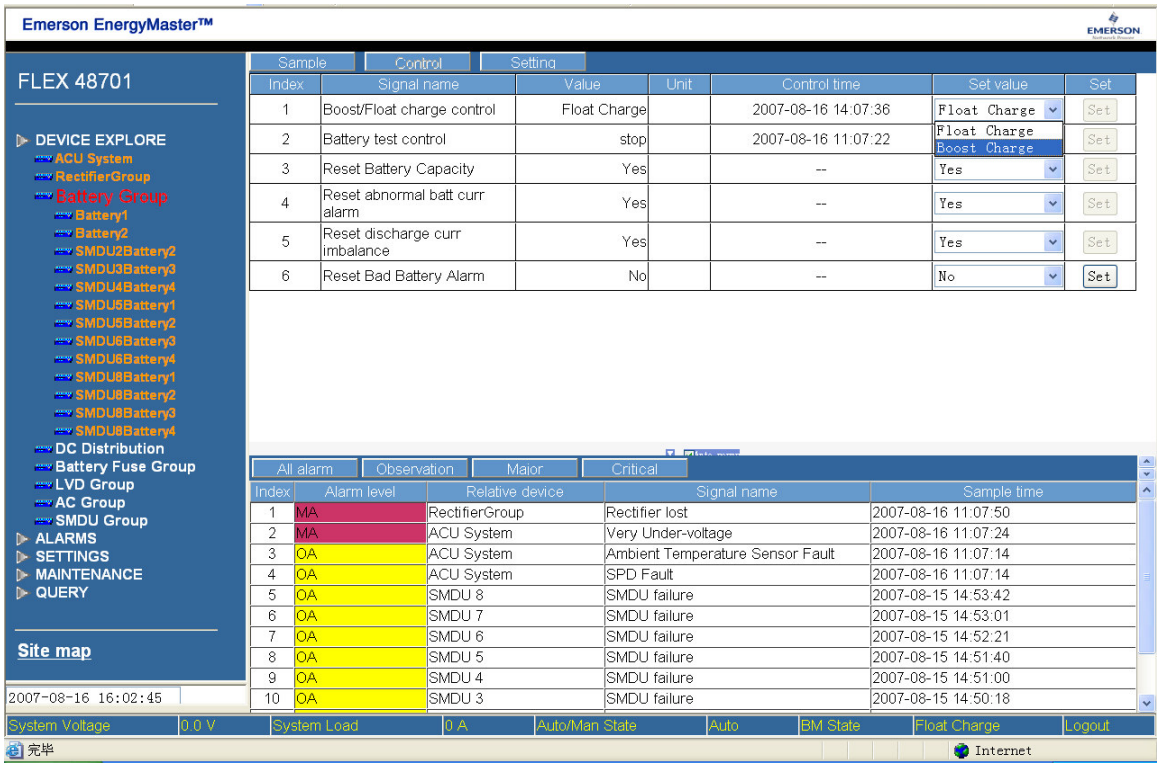


Figure 5-12 Control the battery group

In the screen shown in Figure 4-12, the user can control the battery. For example, in the “Set value” box of “Boost/Float charge control”, the user can set the “Float Charge” to “Boost Charge”, and click the button “set” to make the setting become effective. Click the button “setting” to view setting signals of the battery as shown in Figure 4-13.

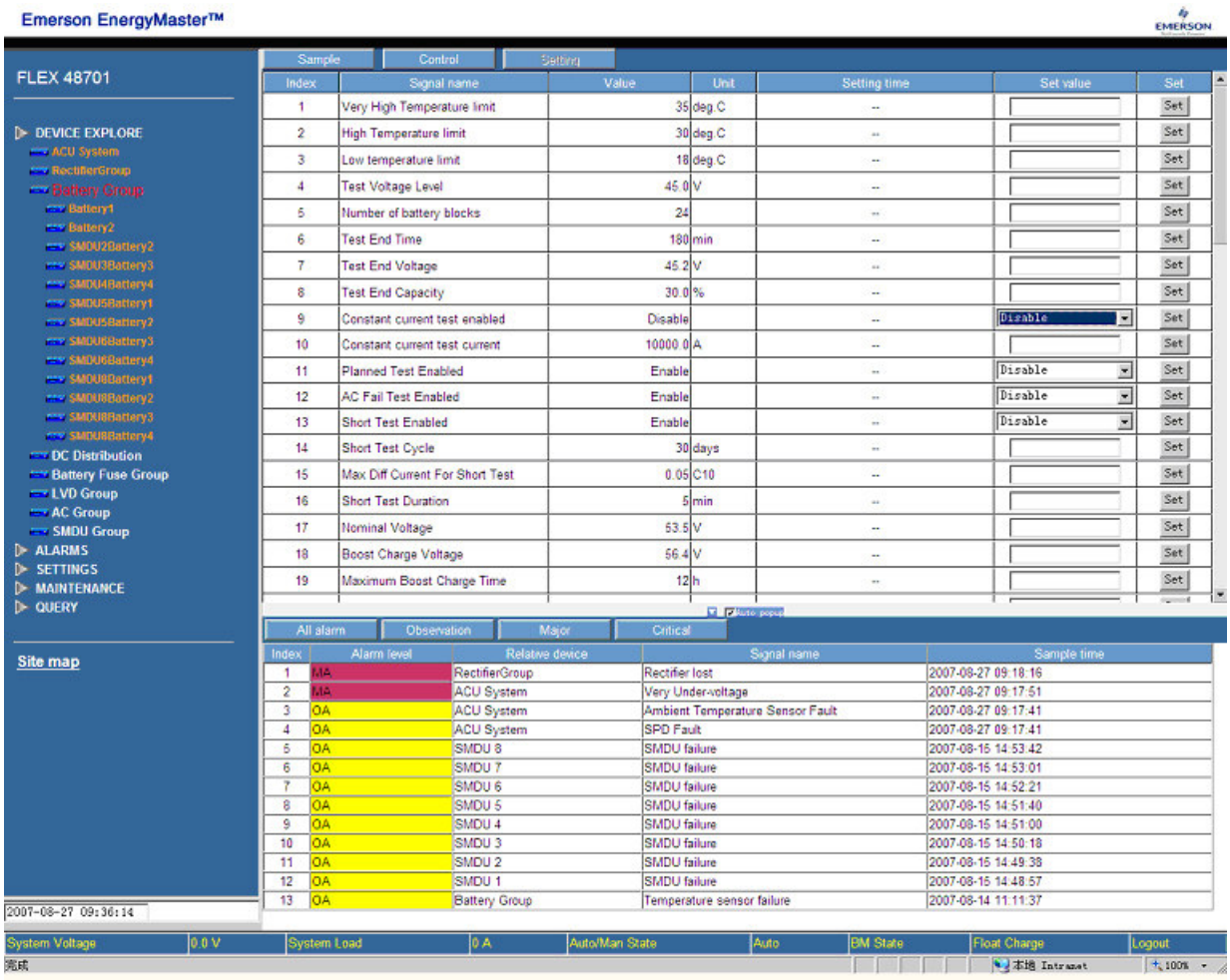


Figure 5-13 Setting values of battery group

In the screen shown in Figure 4-13, the user can set the battery parameters. For example, in the “Set value” box of “Very High Temperature Limit”, the user can set the “temperature limit” from “36.00” to “38.00”, and click the button “set” to make the setting become effective.

Click the submenu of “Battery1”, the following screen pops up:

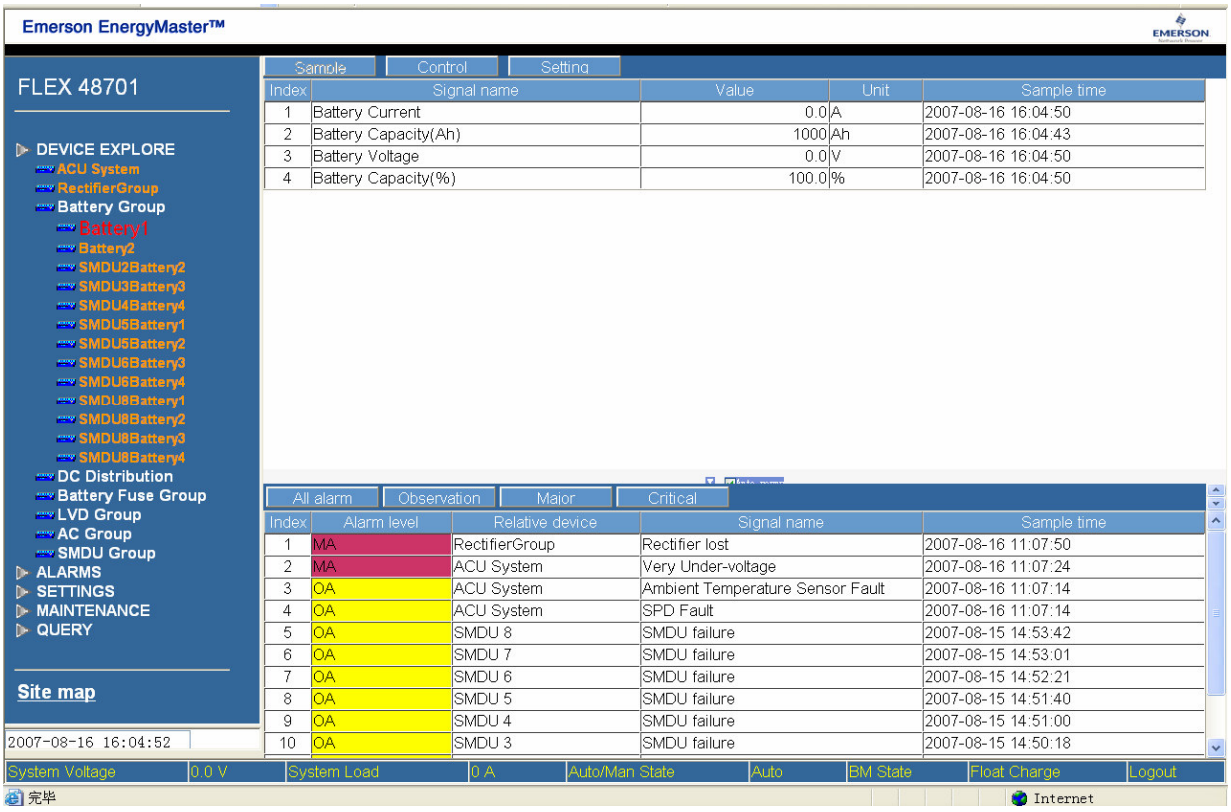


Figure 5-14 Sampled values of battery 1

The screen shown in Figure 4-14 displays the sampled values of battery 1. In this screen, if the user click “Control” or “Setting”, nothing will be displayed because it is not allowed to control the single battery or set the values of the single battery.

Click “SMDU2Battery2”, following screen pops up:

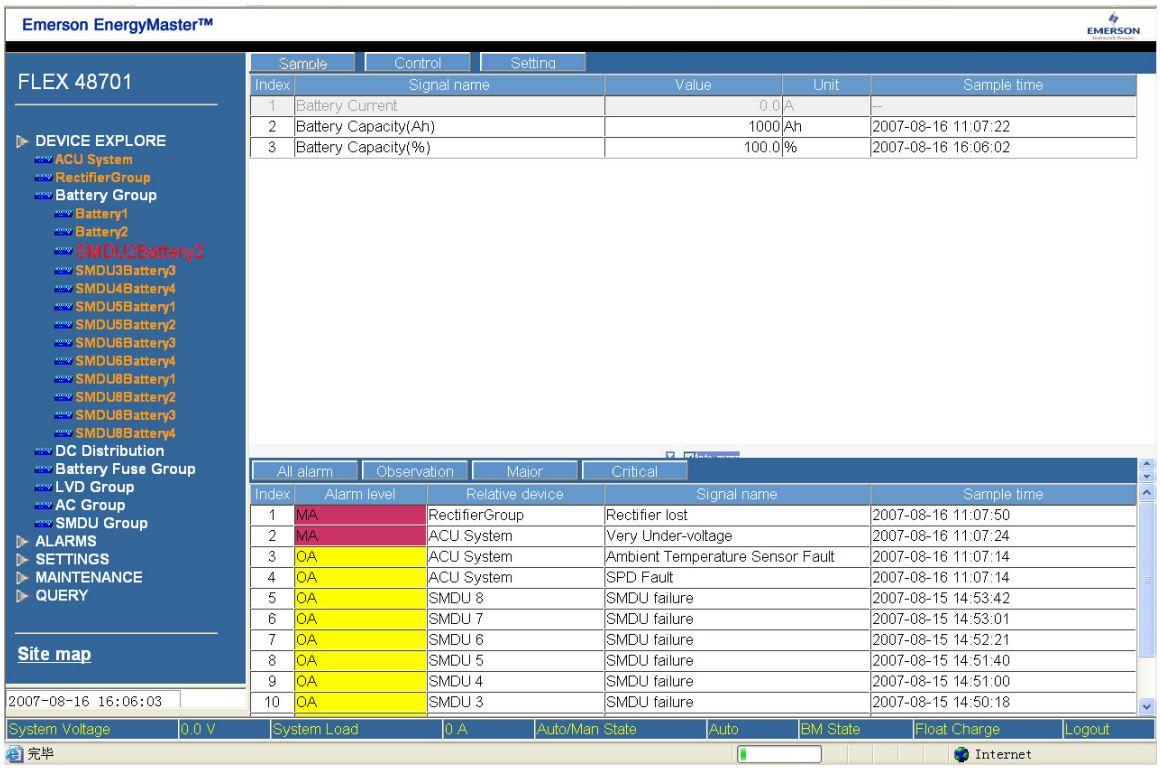


Figure 5-15 SM Battery sample signal

Figure 4-15 shows the sampled values of SM battery 1. Click the button [Setting], to configure the battery parameters.

Data browse, control and parameter setting of SMDU Group

Click the menu of SMDU Group and then the submenu of SMDU1, following screen shows up:

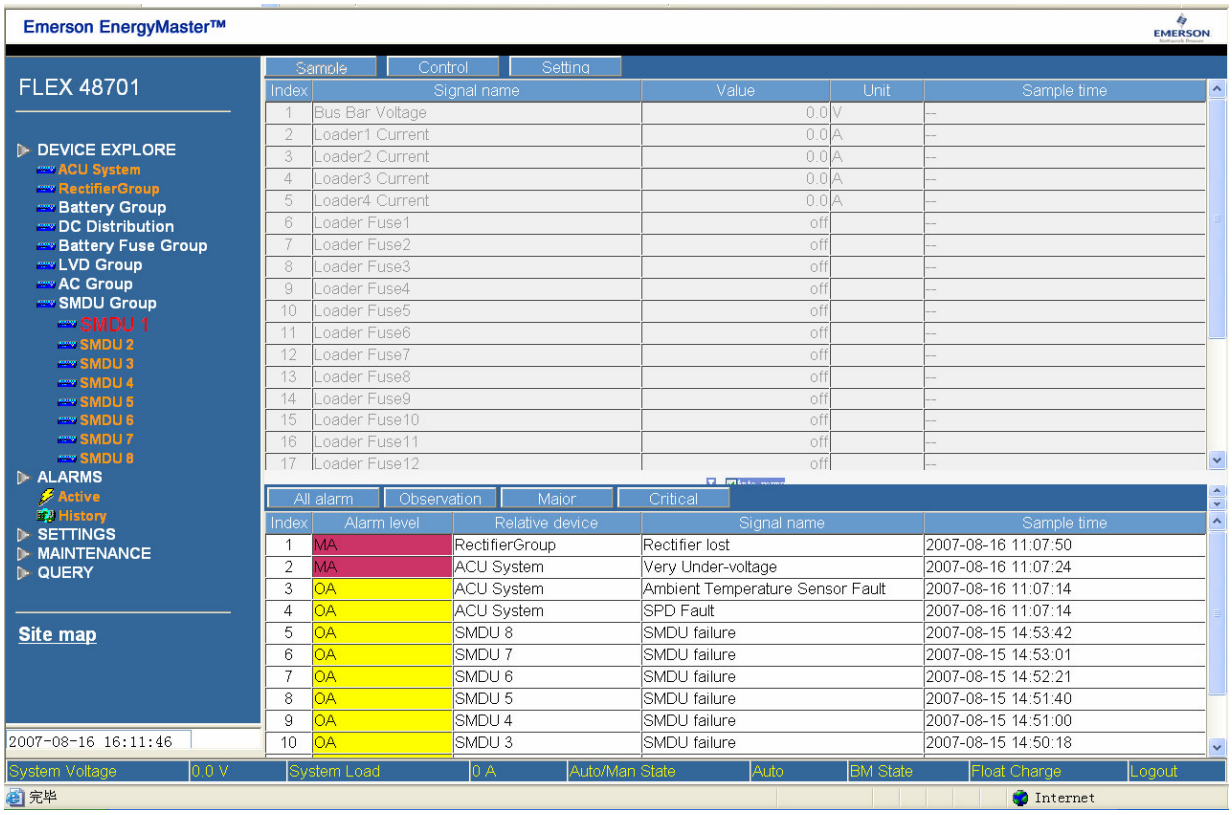


Figure 5-16 Data of SMDU1

Click the “Control” button to perform LVD control, for example, the user can set “LVD1 control” to “on” or “off” as shown in the following Figure:

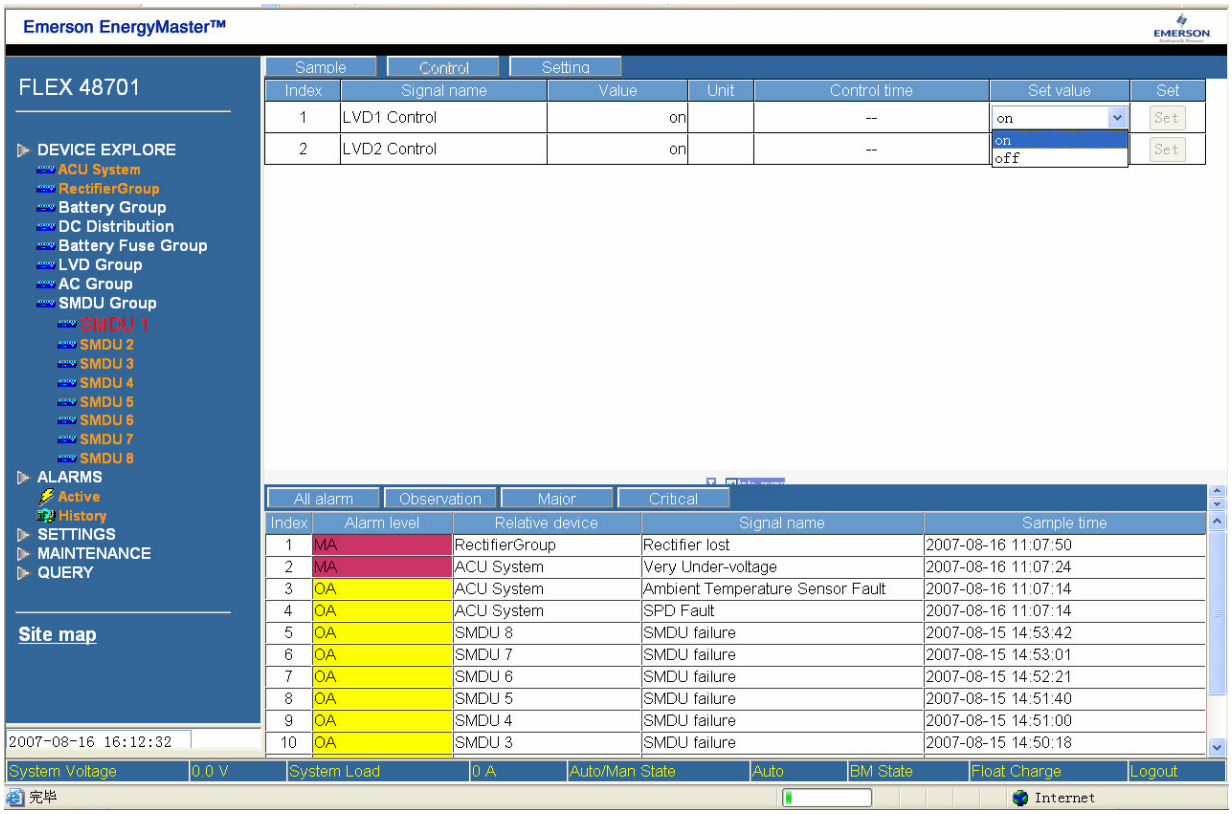


Figure 5-17 LVD control

Click “Setting” button to set the parameters of SM DU. For example, the user can enable or disable LVD1 in the following screen:

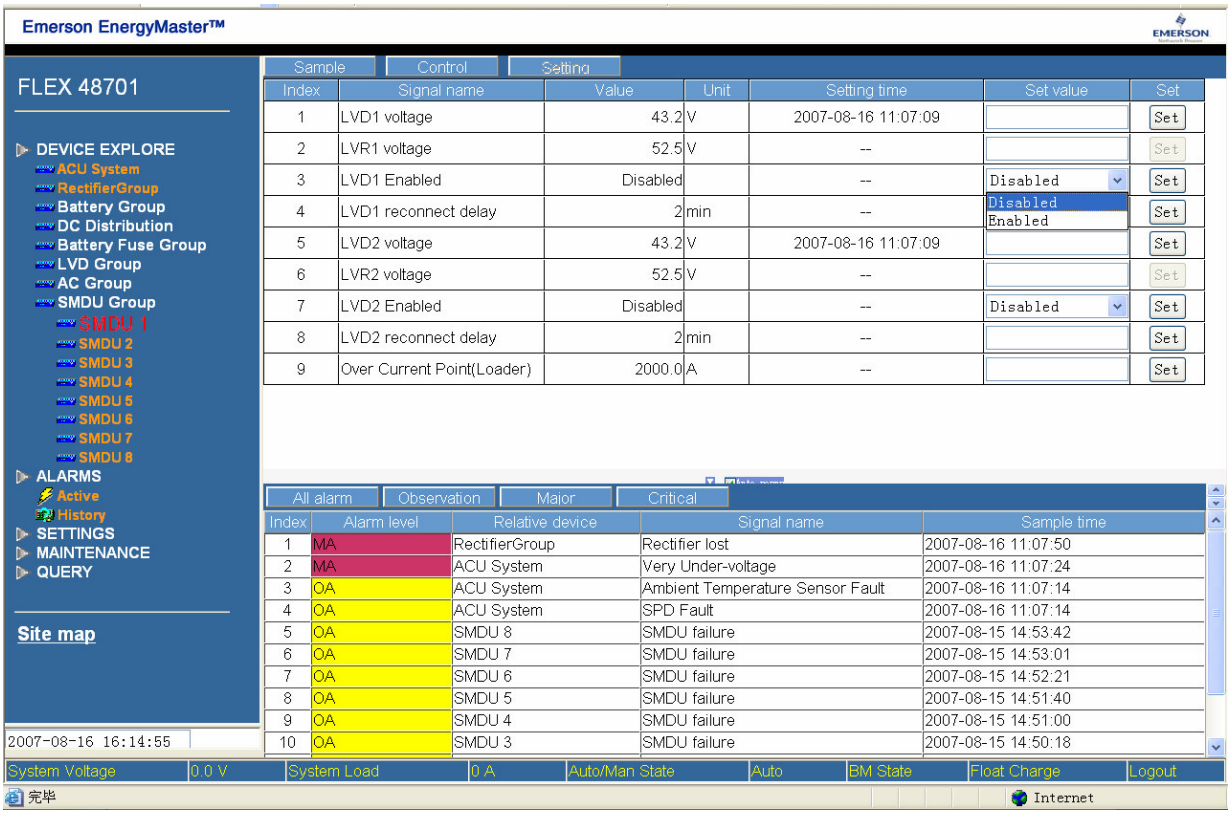

Emerson EnergyMaster™
EMERSON
FLEX 48701
DEVICE EXPLORE
ACU System
RectifierGroup
Battery Group
DC Distribution
Battery Fuse Group
LVD Group
AC Group
SMDU Group
SMDU 1
SMDU 2
SMDU 3
SMDU 4
SMDU 5
SMDU 6
SMDU 7
SMDU 8
ALARMS
Active
History
SETTINGS
MAINTENANCE
QUERY
Site map
2007-08-16 16:14:55
Sample
Control
Setting
Index | Signal name | Value | Unit | Setting time | Set value | Set
1 | LVD1 voltage | 43.2 | V | 2007-08-16 11:07:09 | | Set
2 | LVR1 voltage | 52.5 | V | -- | | Set
3 | LVD1 Enabled | Disabled | | -- | Disabled | Set
4 | LVD1 reconnect delay | 2 | min | -- | Disabled Enabled | Set
5 | LVD2 voltage | 43.2 | V | 2007-08-16 11:07:09 | | Set
6 | LVR2 voltage | 52.5 | V | -- | | Set
7 | LVD2 Enabled | Disabled | | -- | Disabled | Set
8 | LVD2 reconnect delay | 2 | min | -- | | Set
9 | Over Current Point(Loader) | 2000.0 | A | -- | | Set
All alarm
Observation
Major
Critical
Index | Alarm level | Relative device | Signal name | Sample time
1 | MA | RectifierGroup | Rectifier lost | 2007-08-16 11:07:50
2 | MA | ACU System | Very Under-voltage | 2007-08-16 11:07:24
3 | OA | ACU System | Ambient Temperature Sensor Fault | 2007-08-16 11:07:14
4 | OA | ACU System | SPD Fault | 2007-08-16 11:07:14
5 | OA | SMDU 8 | SMDU failure | 2007-08-15 14:53:42
6 | OA | SMDU 7 | SMDU failure | 2007-08-15 14:53:01
7 | OA | SMDU 6 | SMDU failure | 2007-08-15 14:52:21
8 | OA | SMDU 5 | SMDU failure | 2007-08-15 14:51:40
9 | OA | SMDU 4 | SMDU failure | 2007-08-15 14:51:00
10 | OA | SMDU 3 | SMDU failure | 2007-08-15 14:50:18
System Voltage | 0.0 V | System Load | 0 A | Auto/Man State | Auto | BM State | Float Charge | Logout
完毕
Internet

Figure 5-18 LVD disable/enable

5.3.5 Alarms

In any screen, click the icon “ ▼ ” located in the middle bottom part of the screen to pop up the alarm screen as shown below:

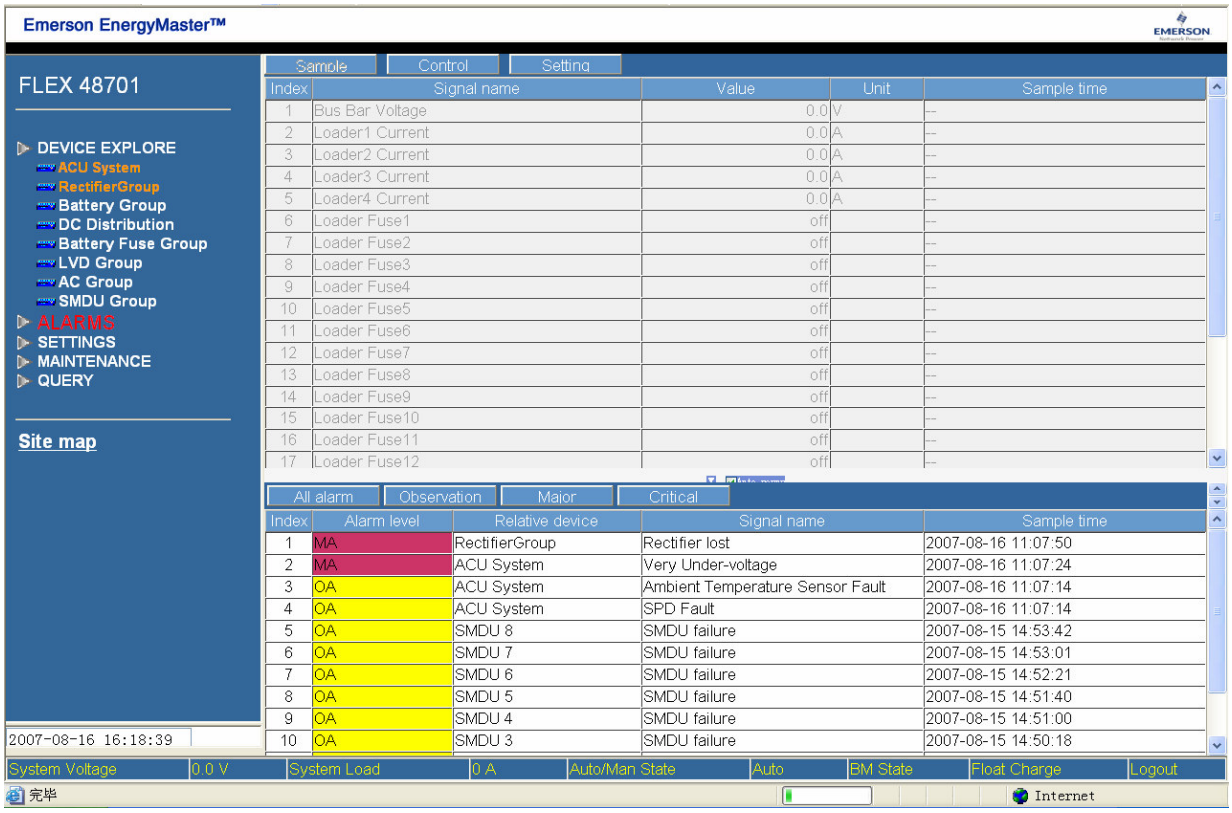


Figure 5-19 Alarm screen

The screen shown in Figure 4-19 shows all the alarms. Click the button “Observation”, all the observation alarms will be displayed:

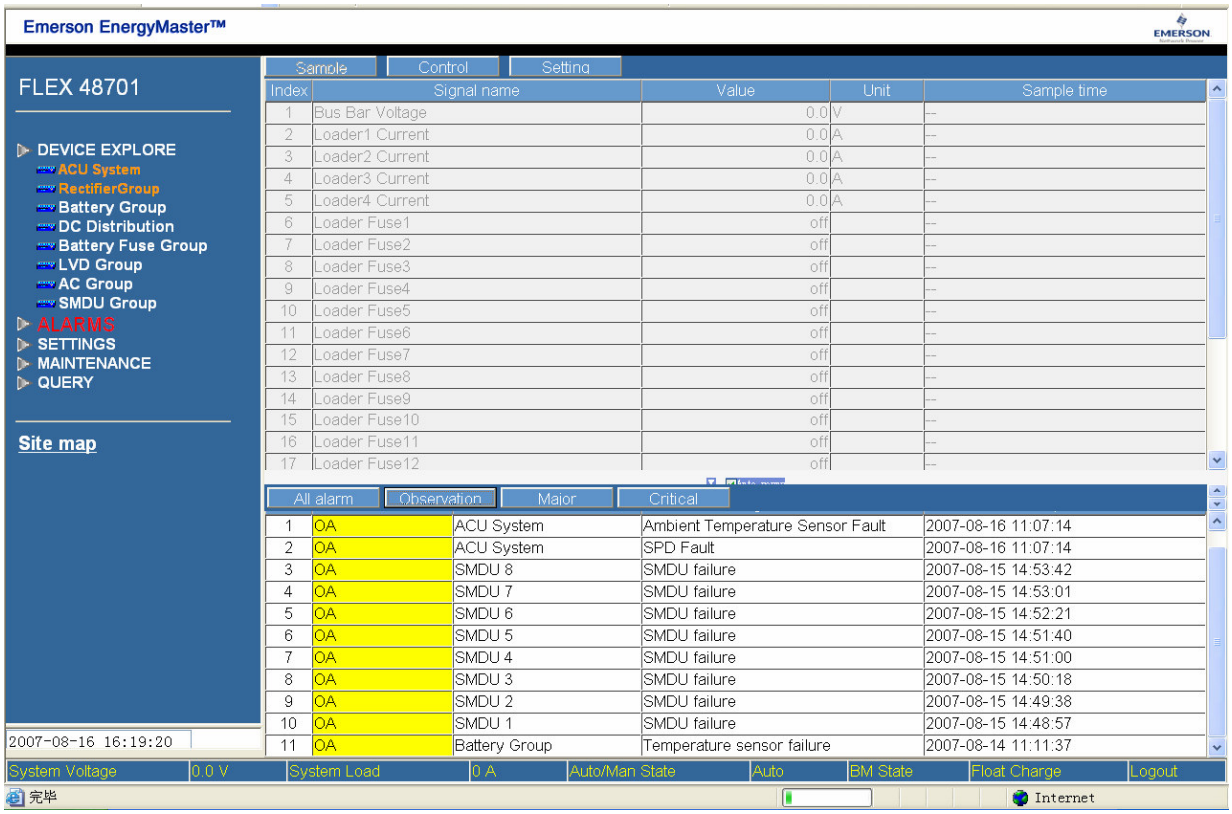


Figure 5-20 Observation alarm

In the same way, click “Major” to display all the major alarms and click “Critical” to display all the critical alarms. The observation alarm is displayed in yellow color. The major alarm is displayed in pink color and the critical alarm is displayed in red color.

To view the history alarm, click the submenu “History” of “Alarms”, history alarm query screen pops up. In the screen, select device first (for example, select “All device”), enter the start time and end time (for example from 00:00:00 August 16, 2007 to 23:59:59 August 16, 2007), click “Query”, then the history alarm recorded from 00:00:00 August 16, 2007 to 23:59:59 August 16, 2007 for the device will be displayed.

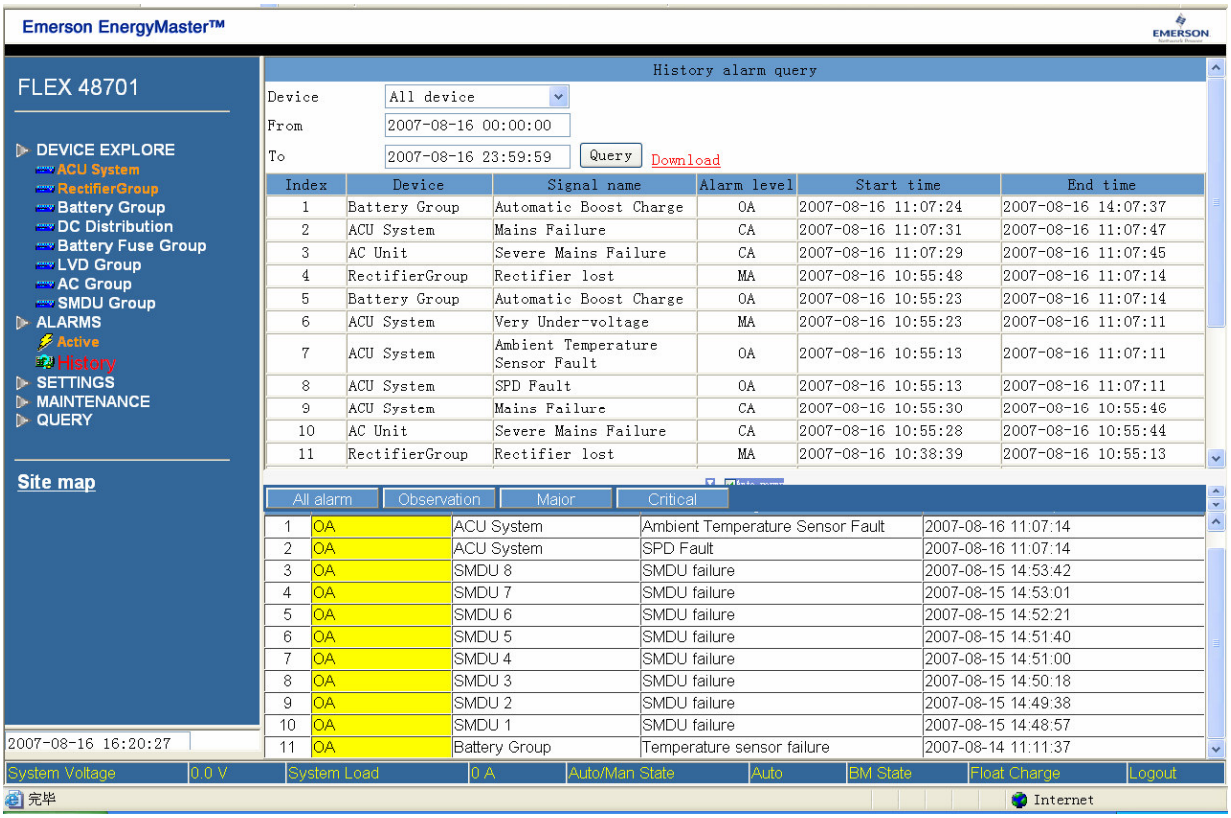

Emerson EnergyMaster™
EMERSON
FLEX 48701
DEVICE EXPLORE
ACU System
RectifierGroup
Battery Group
DC Distribution
Battery Fuse Group
LVD Group
AC Group
SMDU Group
ALARMS
Active
History
SETTINGS
MAINTENANCE
QUERY
Site map
2007-08-16 16:20:27
History alarm query
Device All device
From 2007-08-16 00:00:00
To 2007-08-16 23:59:59
Query
Download
Index | Device | Signal name | Alarm level | Start time | End time
1 | Battery Group | Automatic Boost Charge | OA | 2007-08-16 11:07:24 | 2007-08-16 14:07:37
2 | ACU System | Mains Failure | CA | 2007-08-16 11:07:31 | 2007-08-16 11:07:47
3 | AC Unit | Severe Mains Failure | CA | 2007-08-16 11:07:29 | 2007-08-16 11:07:45
4 | RectifierGroup | Rectifier lost | MA | 2007-08-16 10:55:48 | 2007-08-16 11:07:14
5 | Battery Group | Automatic Boost Charge | OA | 2007-08-16 10:55:23 | 2007-08-16 11:07:14
6 | ACU System | Very Under-voltage | MA | 2007-08-16 10:55:23 | 2007-08-16 11:07:11
7 | ACU System | Ambient Temperature Sensor Fault | OA | 2007-08-16 10:55:13 | 2007-08-16 11:07:11
8 | ACU System | SPD Fault | OA | 2007-08-16 10:55:13 | 2007-08-16 11:07:11
9 | ACU System | Mains Failure | CA | 2007-08-16 10:55:30 | 2007-08-16 10:55:46
10 | AC Unit | Severe Mains Failure | CA | 2007-08-16 10:55:28 | 2007-08-16 10:55:44
11 | RectifierGroup | Rectifier lost | MA | 2007-08-16 10:38:39 | 2007-08-16 10:55:13
All alarm | Observation | Major | Critical
1 | OA | ACU System | Ambient Temperature Sensor Fault | 2007-08-16 11:07:14
2 | OA | ACU System | SPD Fault | 2007-08-16 11:07:14
3 | OA | SMDU 8 | SMDU failure | 2007-08-15 14:53:42
4 | OA | SMDU 7 | SMDU failure | 2007-08-15 14:53:01
5 | OA | SMDU 6 | SMDU failure | 2007-08-15 14:52:21
6 | OA | SMDU 5 | SMDU failure | 2007-08-15 14:51:40
7 | OA | SMDU 4 | SMDU failure | 2007-08-15 14:51:00
8 | OA | SMDU 3 | SMDU failure | 2007-08-15 14:50:18
9 | OA | SMDU 2 | SMDU failure | 2007-08-15 14:49:38
10 | OA | SMDU 1 | SMDU failure | 2007-08-15 14:48:57
11 | OA | Battery Group | Temperature sensor failure | 2007-08-14 11:11:37
System Voltage 0.0 V System Load 0 A Auto/Man State Auto BM State Float Charge Logout
完毕
Internet

Figure 5-21 Query history alarm

The information of the history alarm includes the signal name, alarm level, alarm start time and alarm end time. The lower part of the screen displays the active alarm.

5.3.6 Settings

Click the icon in the left of “SETTINGS”, and then click the sub-menu of “Network configuration”, following screen pops up:

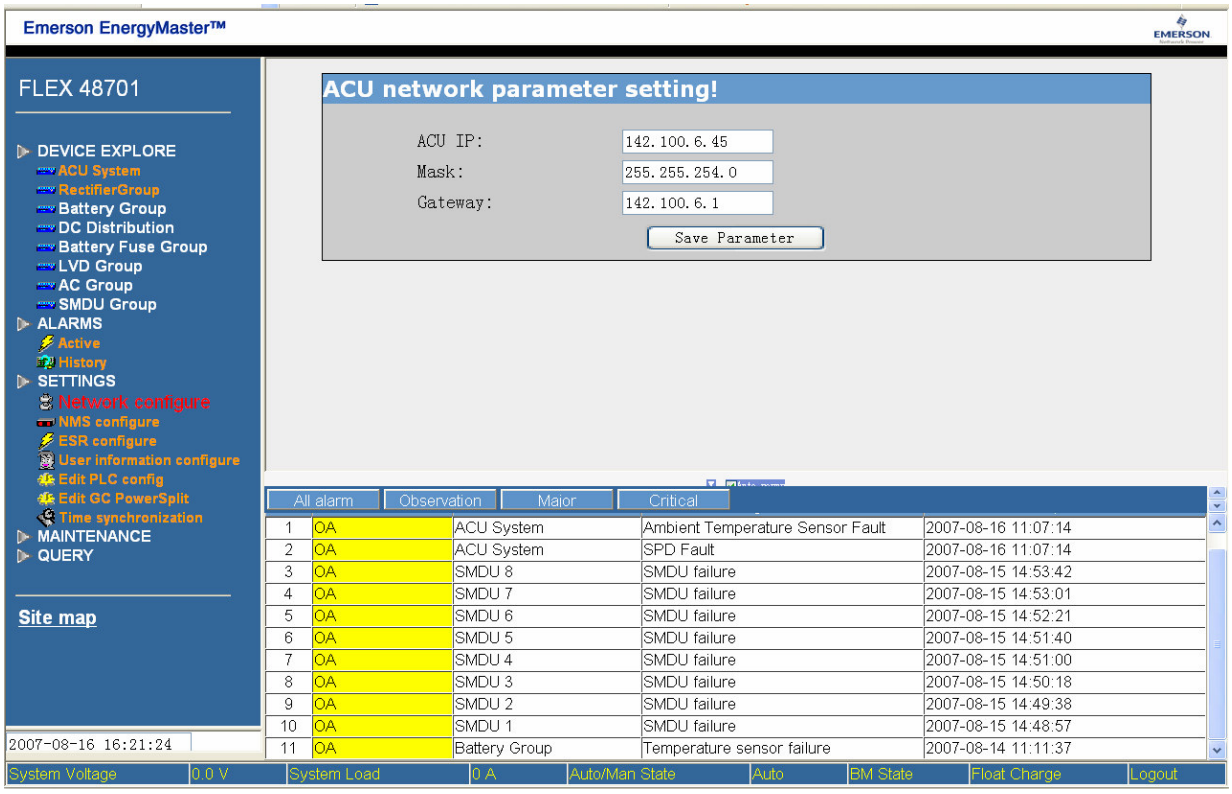


Figure 5-22 Network configuration

In the screen shown in Figure 4-22, the user can configure the network parameters of M800D, such as M800D IP, default gateway and Mask. After modifying the network parameters, click “Save Parameter” to validate the change made the parameters.

After modifying the IP address, be sure to re-log in the M800D with the new IP address.

Click the sub-menu of “NMS Configure”, following screen pops up:

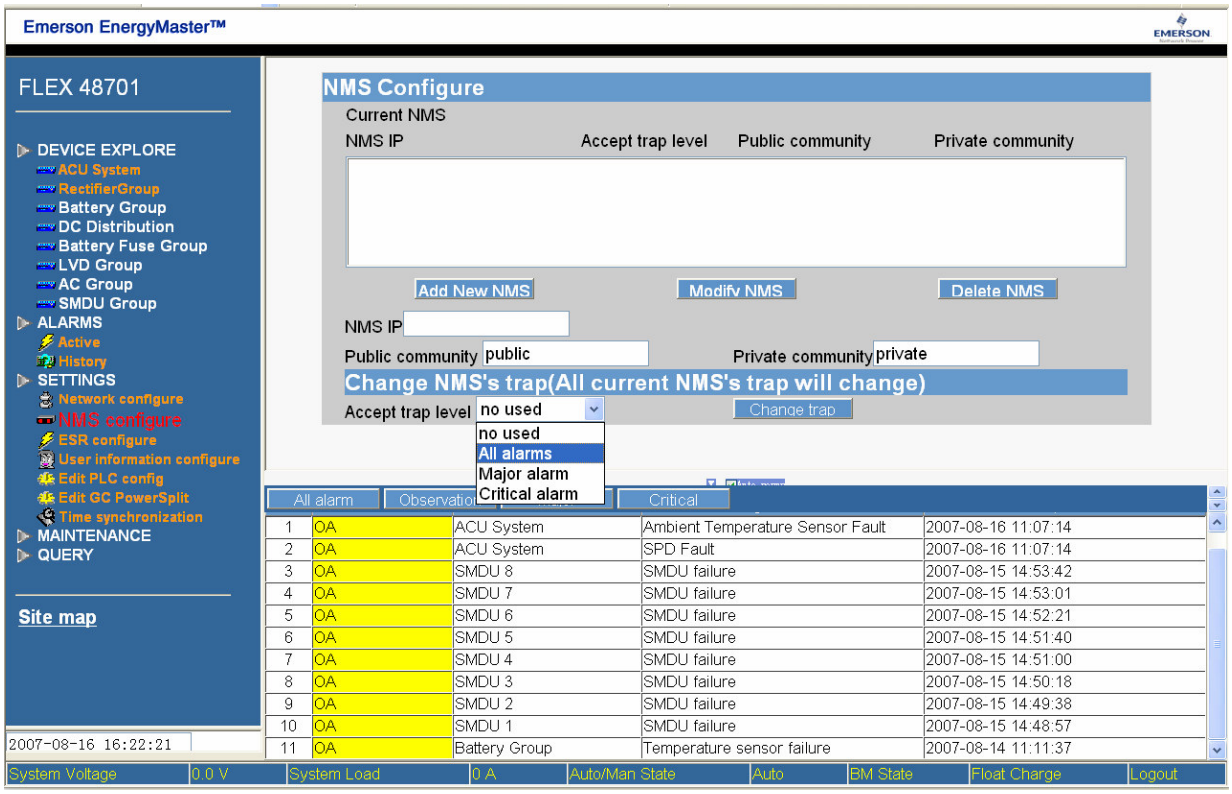


Figure 5-23 NMS configuration

In the screen shown in Figure 4-23, the user can configure the NMS IP, authority and trap level. The user can also add new NMS, modify NMS information and delete the selected NMS through the interface as shown in Figure 4-23. The user can also set the trap level.

Click the sub-menu of “ESR Configure”, following screen pops up:

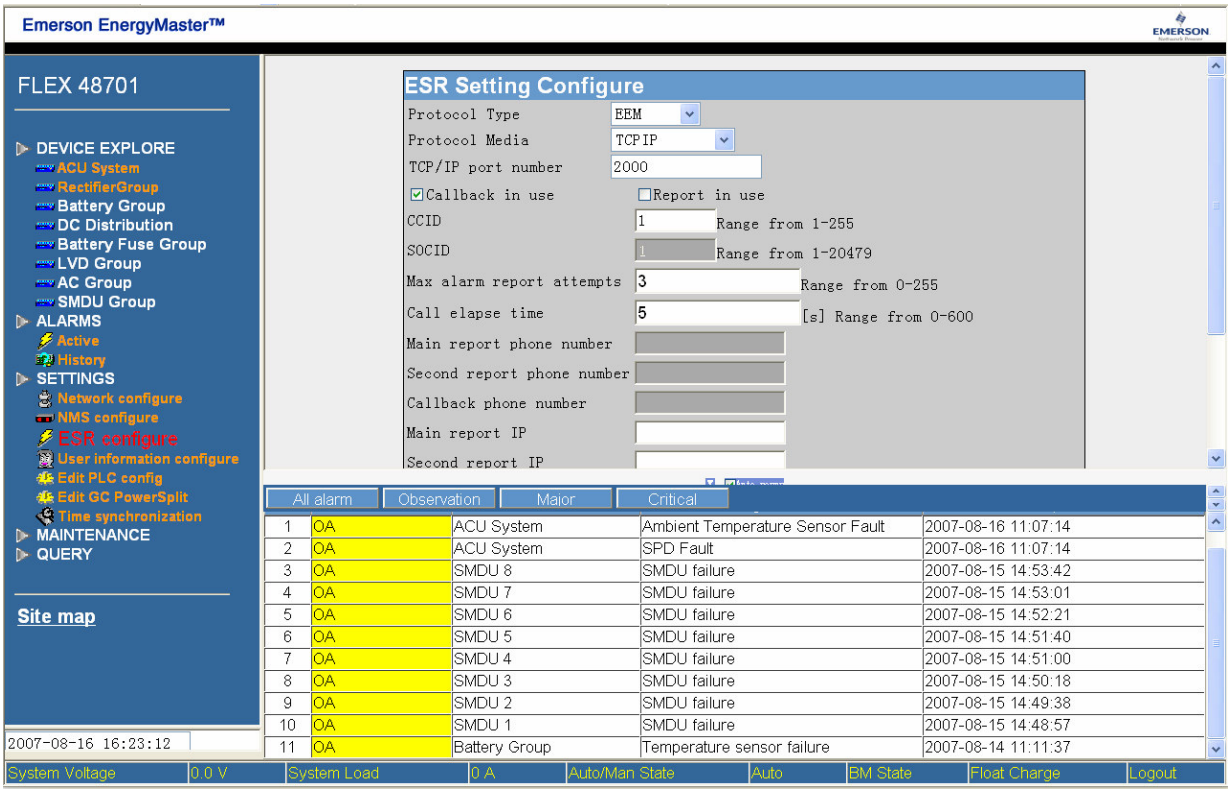


Figure 5-24 ESR configuration

In the screen shown in Figure 4-24, the user can configure the phone number and protocol for communication. Refer to the document of “ESR private configuration” for the meaning of each parameter. Click the sub-menu of “User information”, following screen pops up:

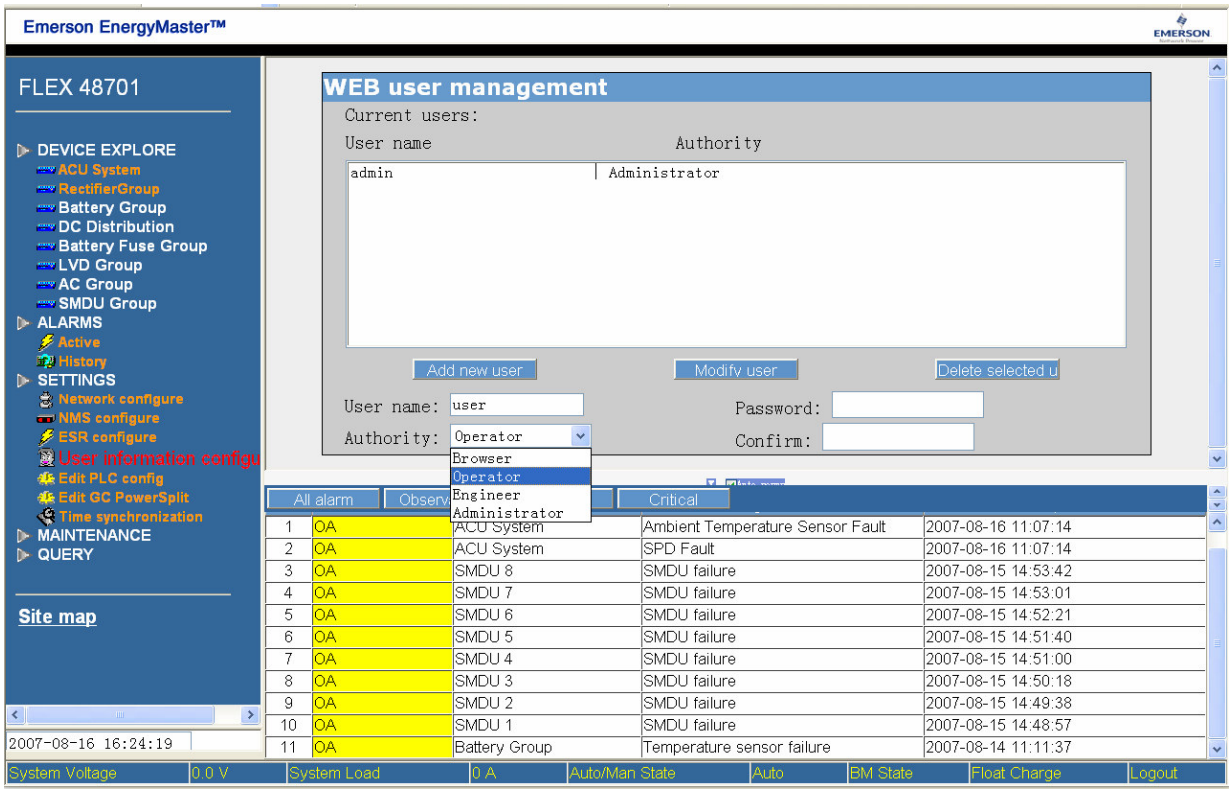


Figure 5-25 User information configuration

In the screen shown in Figure 4-25, the user can add a user, and the method is as follows:

(1) Enter the user name in the box at the right side of “User name”;

(2) Select authority of the user;

(3) Select the user type;

(4) Configure the password for the user;

(5) Finally, click “Add” button to add the user.

The method to delete a user is as follows:

(1) Select the user to be deleted in the user list;

(2) Click “Delete user” to delete the user.

The method to modify a user is as follows:

(1) Select the user to be deleted in the user list;

(2) Modify the user information;

(3) Click “Modify the user” to validate the modified user information.

Any user who visits user interfaces of the M800D, such as LCD, Web interface, Console, shall be assigned with one of the following 5 security levels/user groups:

Table 5-3 User Security Levels

Privilege level	User group	User authority
Level A	Browser	All users can browse power information without any writing permission
Level B	Operator	The operator needs to write one password for control power system
Level C	Engineer	The engineer needs to write one password to get the following access: browsing, control, modifying parameter, downloading configuration file, but except updating application an OS and modifying, adding, deleting user information (user name, user level, password)
Level D	Administrator	The administrator needs to write one password to get full access that include updating application an OS and modifying, adding, deleting user information (user name, user level, password)
Level E	Hardware	A H/W switch is set that makes no writing of any kind possible to the product

Click “Edit PLC Config” and then click “Add” button, the following screen shows up:

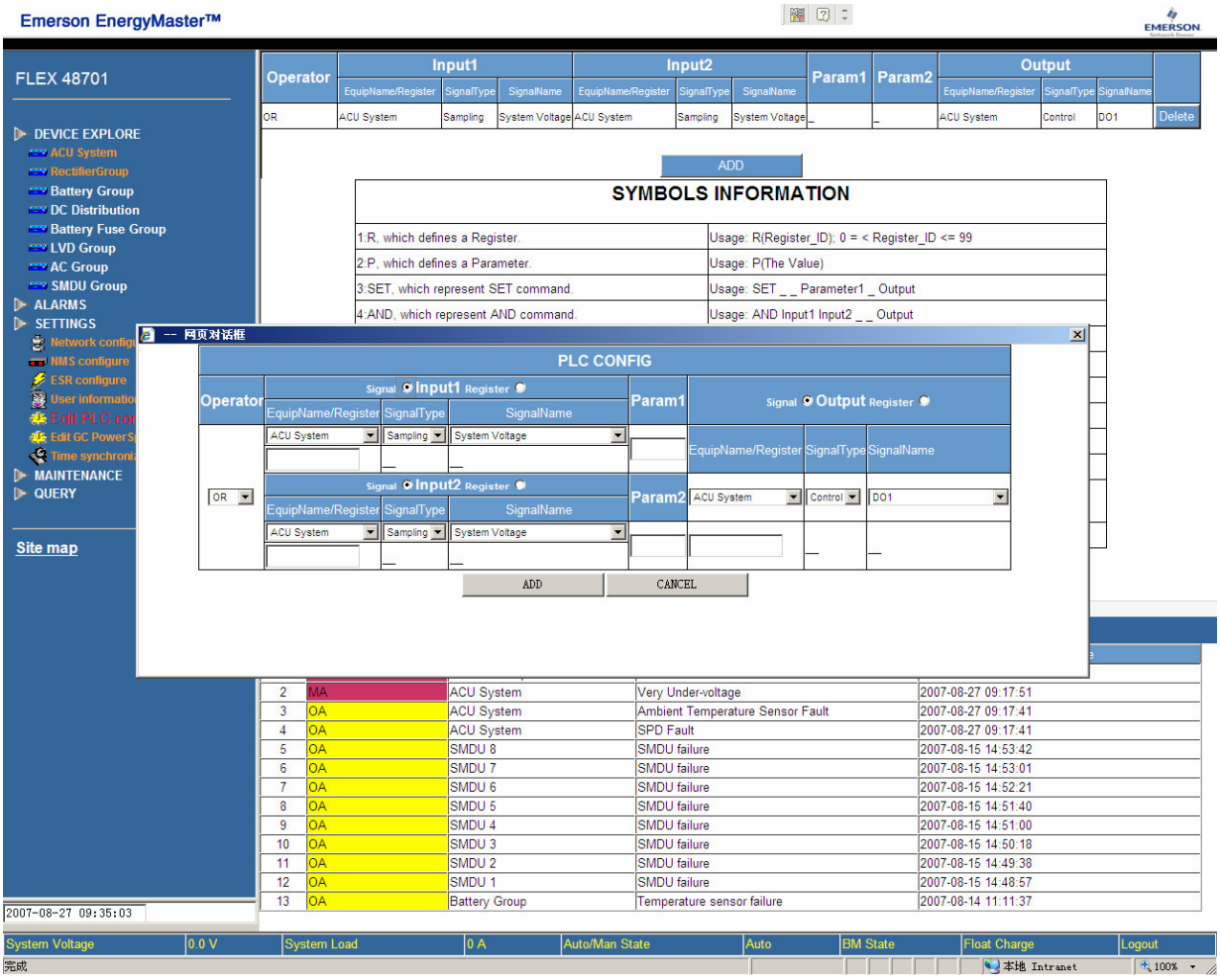


Figure 5-26 PLC Configuration

In the PLC configuration screen, you can configure the equipment name, signal type and signal name to generate a kind of output signal.

User can learn the meanings of symbols such as “AND”, “OR”, “XOR”, “NOT” and so on by checking the page of “SYMBOLS INFORMATION”. For PLC configuration, Select operator in “PLC CONFIG” page, for example, select “OR”;

- Edit “Input1”: Select equipment name, for example, select “ACU System”; Select Signal Type, for example, select “Sampling”, and then select SignalName;
- Edit “Input2”: Same with “Edit Input1”;
- Edit output signals;
- Click “Add” to enable the PLC calculation, or click “Cancel” to cancel the PLC setting.

Click “Edit GC PowerSplit”, the following screen shows up:

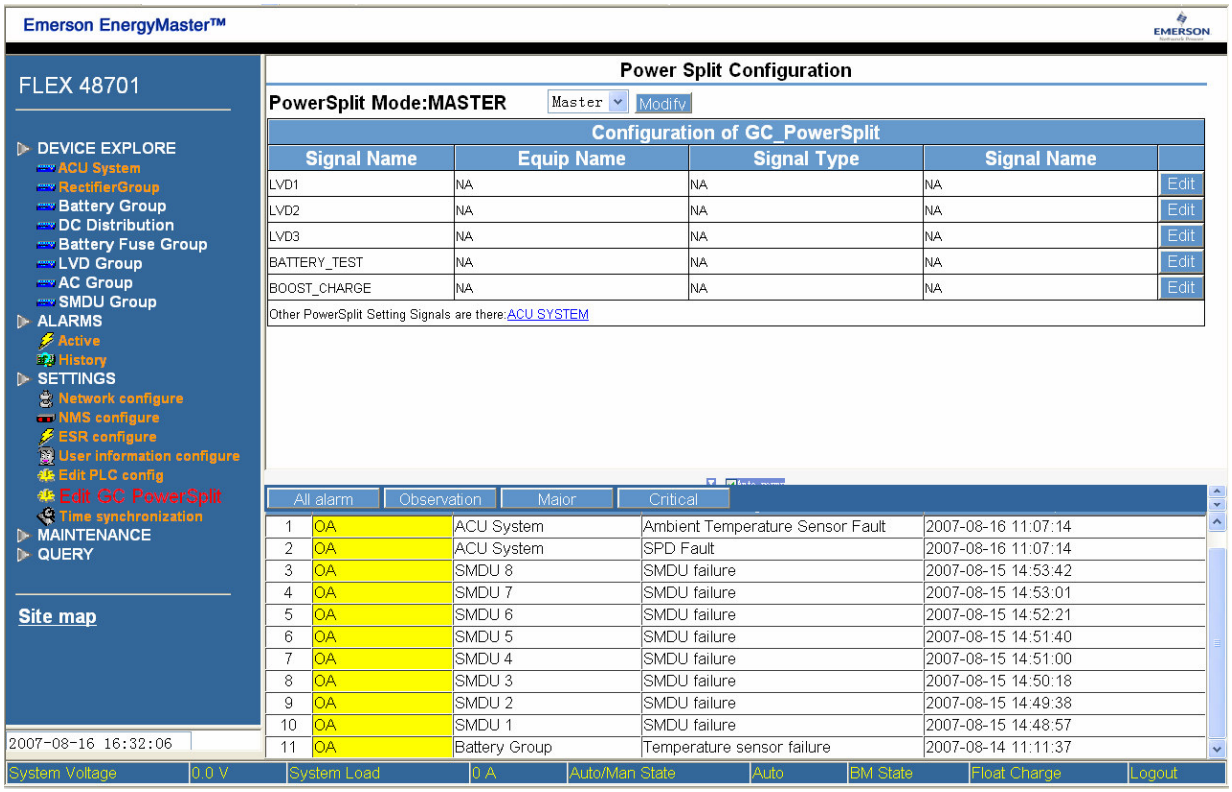


Figure 5-27 Edit GC PowerSplit

In the above screen, click “Edit” button to configure the signals, for example, click the “Edit” button of “BOOST_CHARGE”:

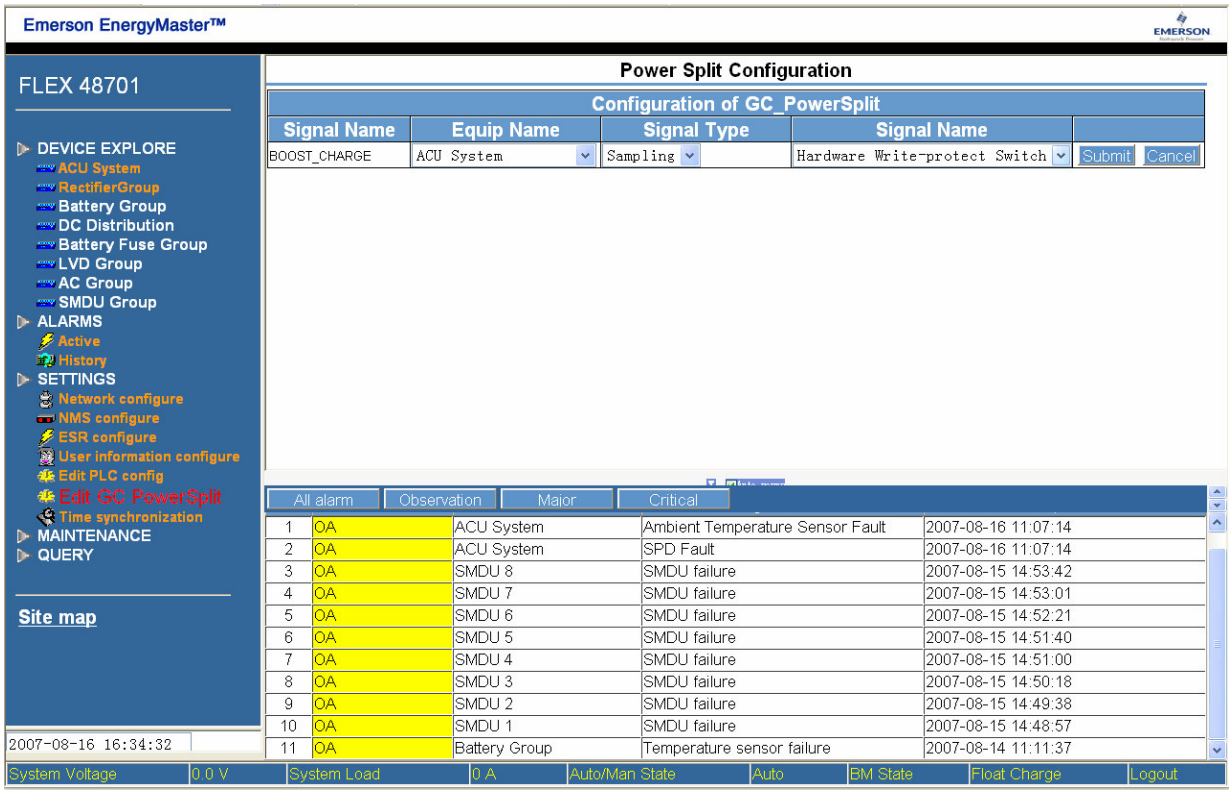


Figure 5-28 Edit the boost charge parameter

Click the sub-menu of “Time synchronization” to calibrate the clock as shown in the screen below:

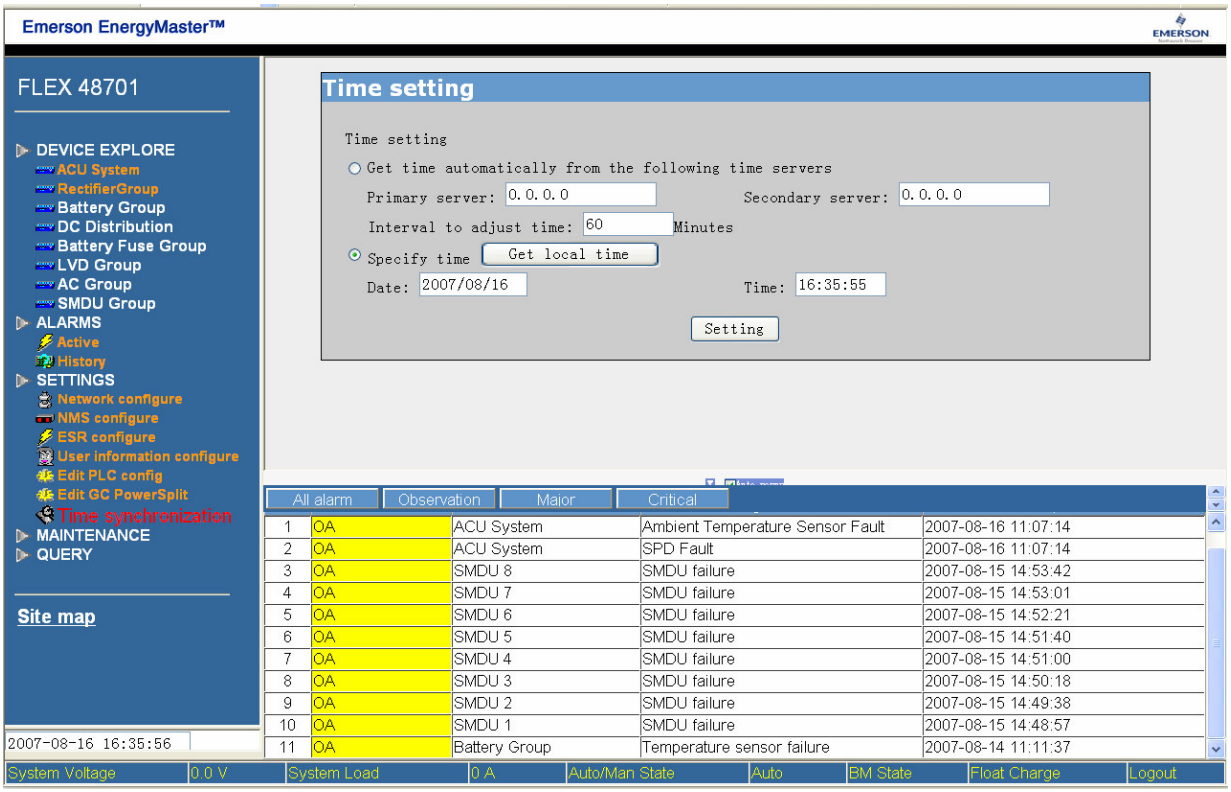


Figure 5-29 Time setting screen

After changing the time, click “Setting” to validate the new time.

5.3.7 Maintenance

Click the menu of “Maintenance”, and then click “Upload/download” sub-menu to upload or download the files, as shown in the figure below:

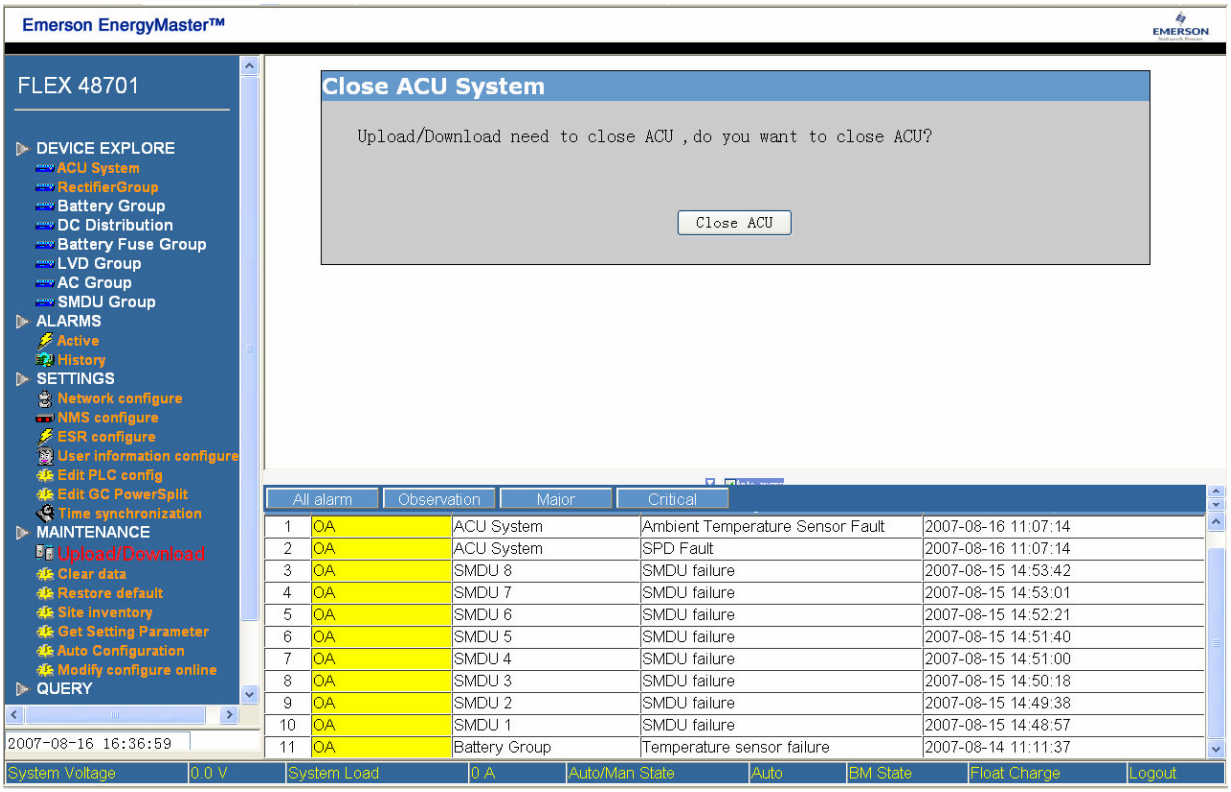


Figure 5-30 Upload/download screen 1

In maintenance status, the user cannot browse the device information. User needs to restart M800D to browse the device information.

Click the button of [Close ACU], and then following screen pops up:

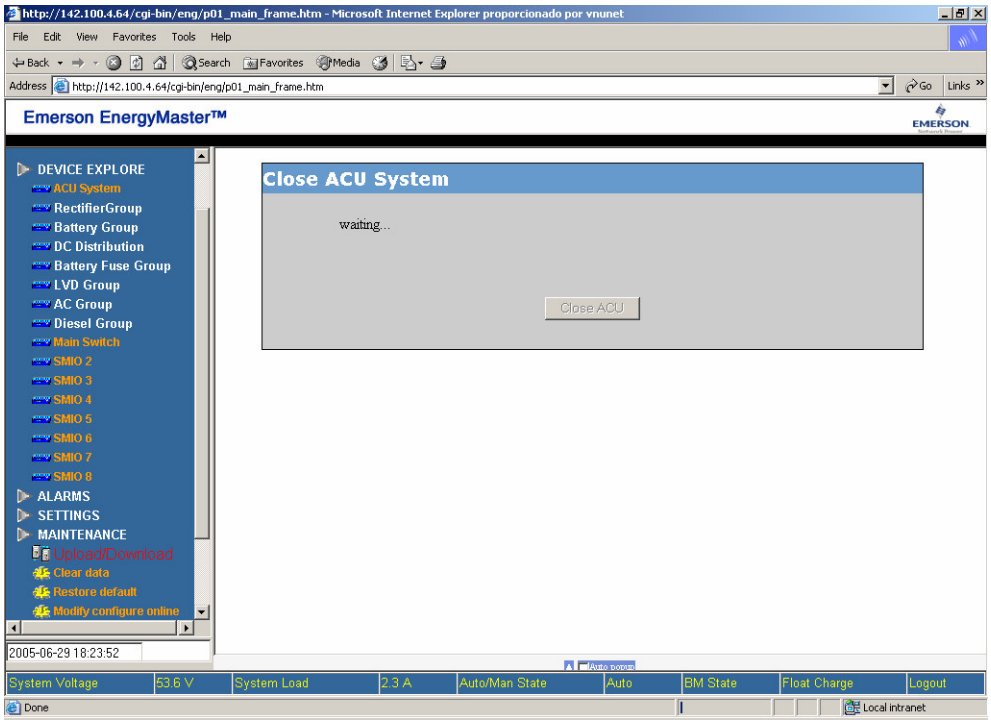


Figure 5-31 Upload/download screen 2

Figure 4-31 shows “Waiting” to prompt the user that M800D is being closed, after M800D is closed, following screen pops up:

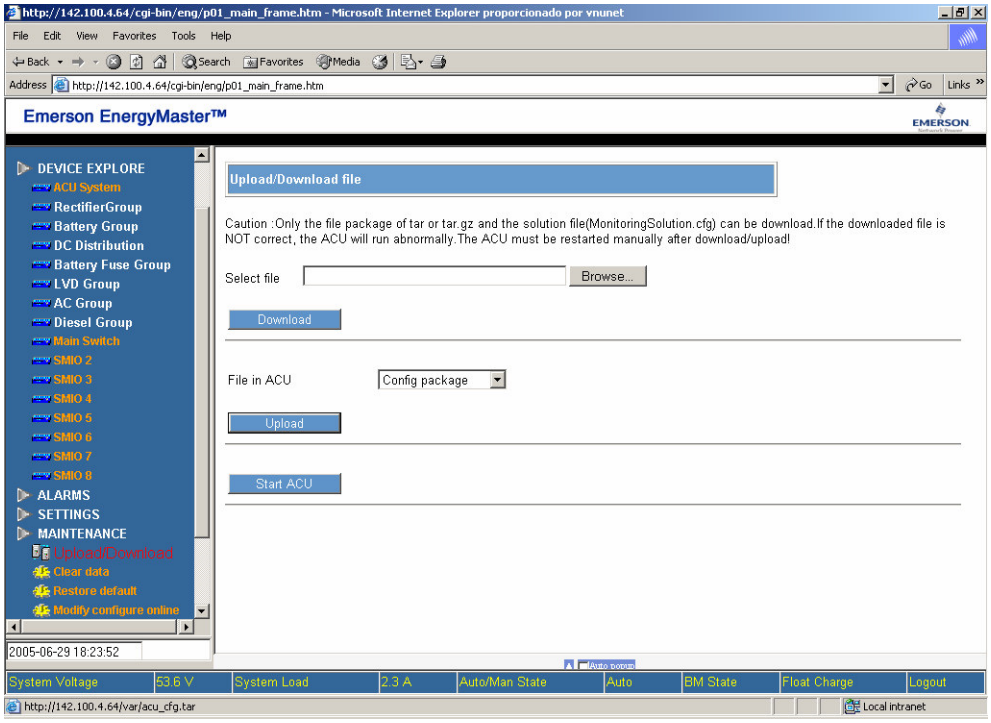


Figure 5-32 Upload/download screen 3

In Figure 4-32, click [Browse…] to find the file folder where the file to be uploaded is located, select the file to be uploaded and then click the button [Upload] to upload the file.

The M800D can download the configuration package file, application program package file and language package file, but the postfix of these files to be downloaded must be “.tar” or “.tar.gz”. The M800D can also download the file with the filename of “MonitoringSolution.cfg”, except the above files, M800D cannot download other kind of files.

The M800D can upload configuration package file and language package file. In the screen shown in Figure 4-32, click “Upload”, a box shows up requiring the user specify the directory where the uploaded file will be placed:

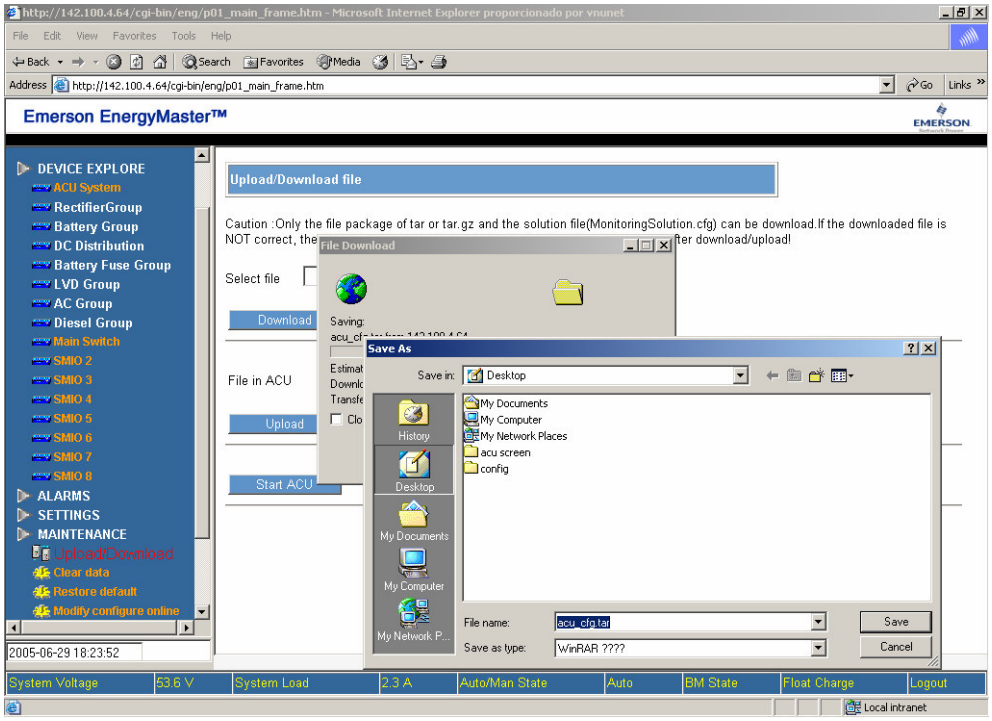


Figure 5-33 Specify a directory

In the screen shown in Figure 4-33, click “Save”, then the file will be placed in desktop. Soon, following screen pops up indicating that the file has been uploaded.

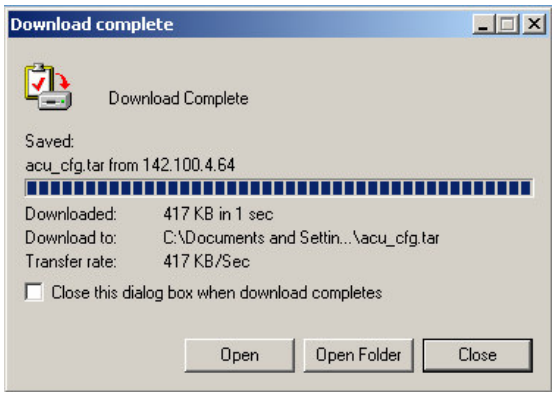


Figure 5-34 Download complete

Click the sub-menu of “Clear data”, following screen pops up:

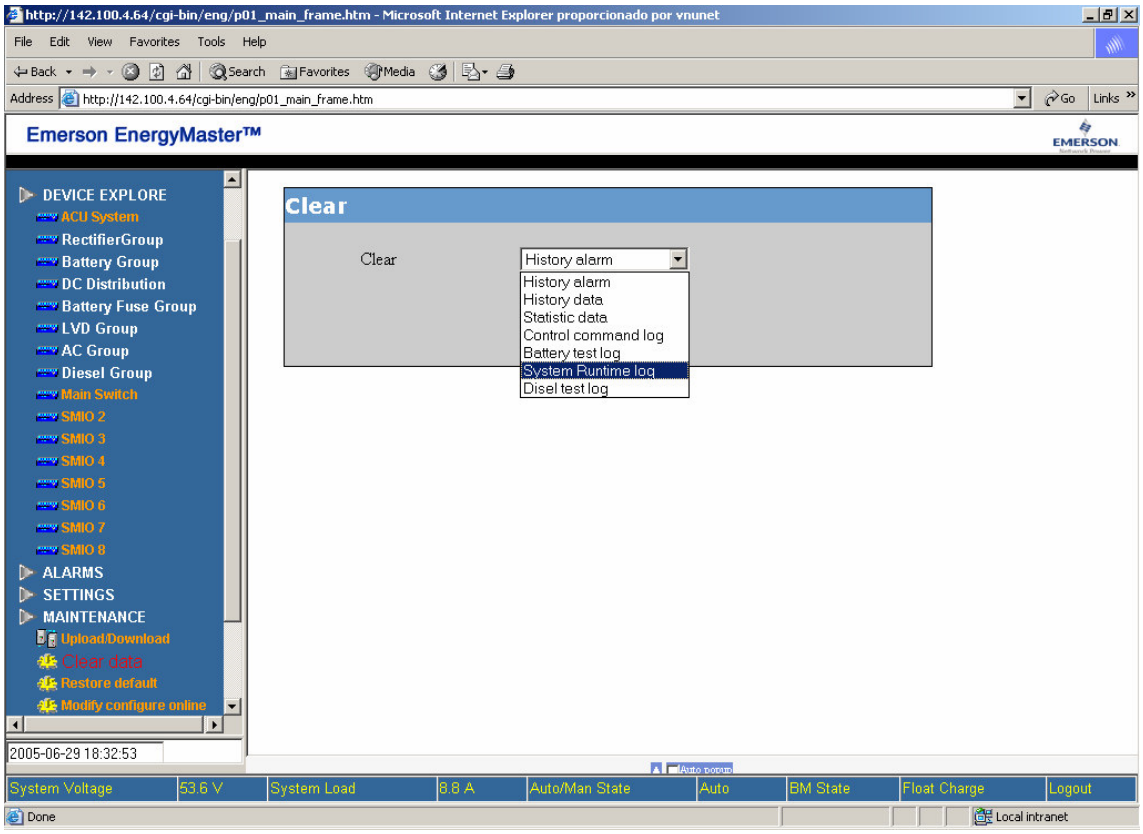


Figure 5-35 Clear data

In the preceding screen, user can select “System Runtime log” to clear the log. In the same way, user can select “History battery test log” to clear the battery test log.

Click the sub-menu of “Restore default”, following screen pops up:

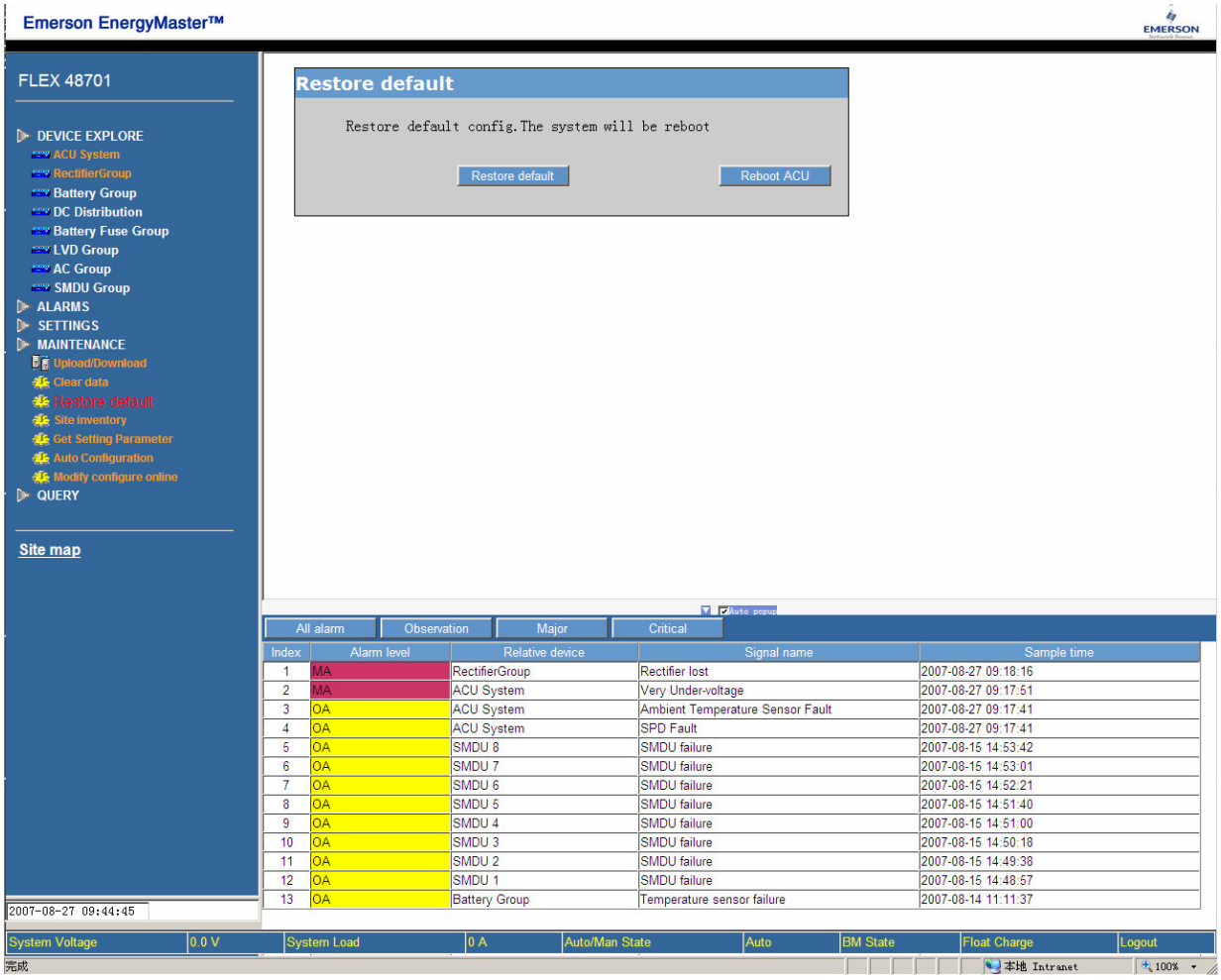


Figure 5-36 Restore default

User can click the button of [Restore default] to restore all the default settings and then click the button [Reboot ACU] to make the default settings become effective.

Note

If the user uses the restore function, M800D may lose the original solution configuration and current parameter settings. After the restore operation, be sure to wait for 5 minutes before re-accessing the M800D through the Web.

Click the sub-menu of “Site inventory”, following screen pops up:

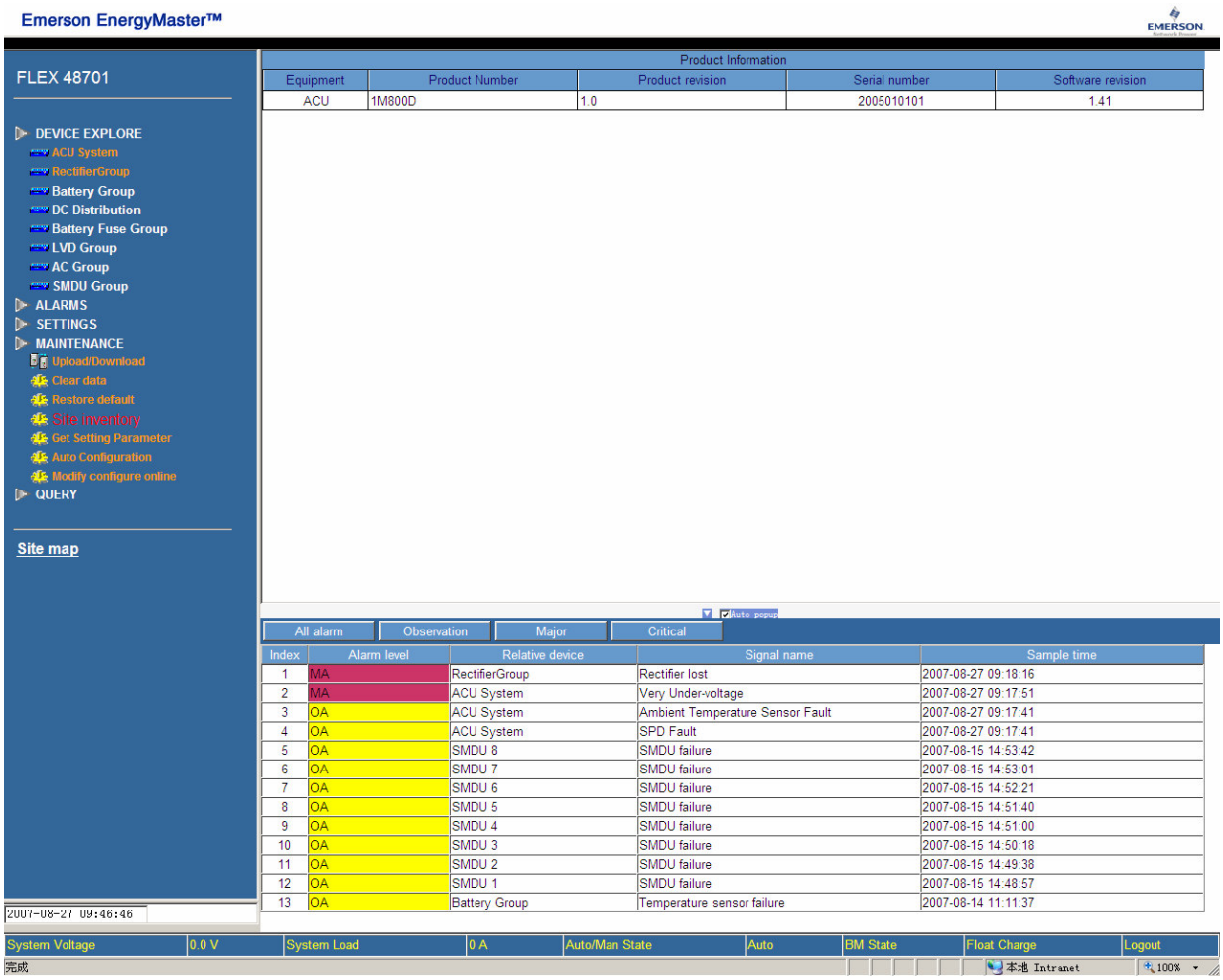

Emerson EnergyMaster™
EMERSON
FLEX 48701
DEVICE EXPLORE
ACU System
RectifierGroup
Battery Group
DC Distribution
Battery Fuse Group
LVD Group
AC Group
SMDU Group
ALARMS
SETTINGS
MAINTENANCE
Upload/Download
Clear data
Restore default
Site inventory
Get Setting Parameter
Auto Configuration
Modify configure online
QUERY
Site map
2007-08-27 09:46:46
Product Information
Equipment | Product Number | Product revision | Serial number | Software revision
ACU | 1M800D | 1.0 | 2005010101 | 1.41
All alarm | Observation | Major | Critical
Index | Alarm level | Relative device | Signal name | Sample time
1 | MA | RectifierGroup | Rectifier lost | 2007-08-27 09:18:16
2 | MA | ACU System | Very Under-voltage | 2007-08-27 09:17:51
3 | OA | ACU System | Ambient Temperature Sensor Fault | 2007-08-27 09:17:41
4 | OA | ACU System | SPD Fault | 2007-08-27 09:17:41
5 | OA | SMDU 8 | SMDU failure | 2007-08-15 14:53:42
6 | OA | SMDU 7 | SMDU failure | 2007-08-15 14:53:01
7 | OA | SMDU 6 | SMDU failure | 2007-08-15 14:52:21
8 | OA | SMDU 5 | SMDU failure | 2007-08-15 14:51:40
9 | OA | SMDU 4 | SMDU failure | 2007-08-15 14:51:00
10 | OA | SMDU 3 | SMDU failure | 2007-08-15 14:50:18
11 | OA | SMDU 2 | SMDU failure | 2007-08-15 14:49:38
12 | OA | SMDU 1 | SMDU failure | 2007-08-15 14:48:57
13 | OA | Battery Group | Temperature sensor failure | 2007-08-14 11:11:37
System Voltage | 0.0 V | System Load | 0 A | Auto/Man State | Auto | BM State | Float Charge | Logout
本地 Intranet
100%

Figure 5-37 Site inventory

The screen shown in Figure 4-37 displays the product information which is sampled by M800D monitoring module. Click the sub-menu of “Get Setting Parameter”, following screen pops up:

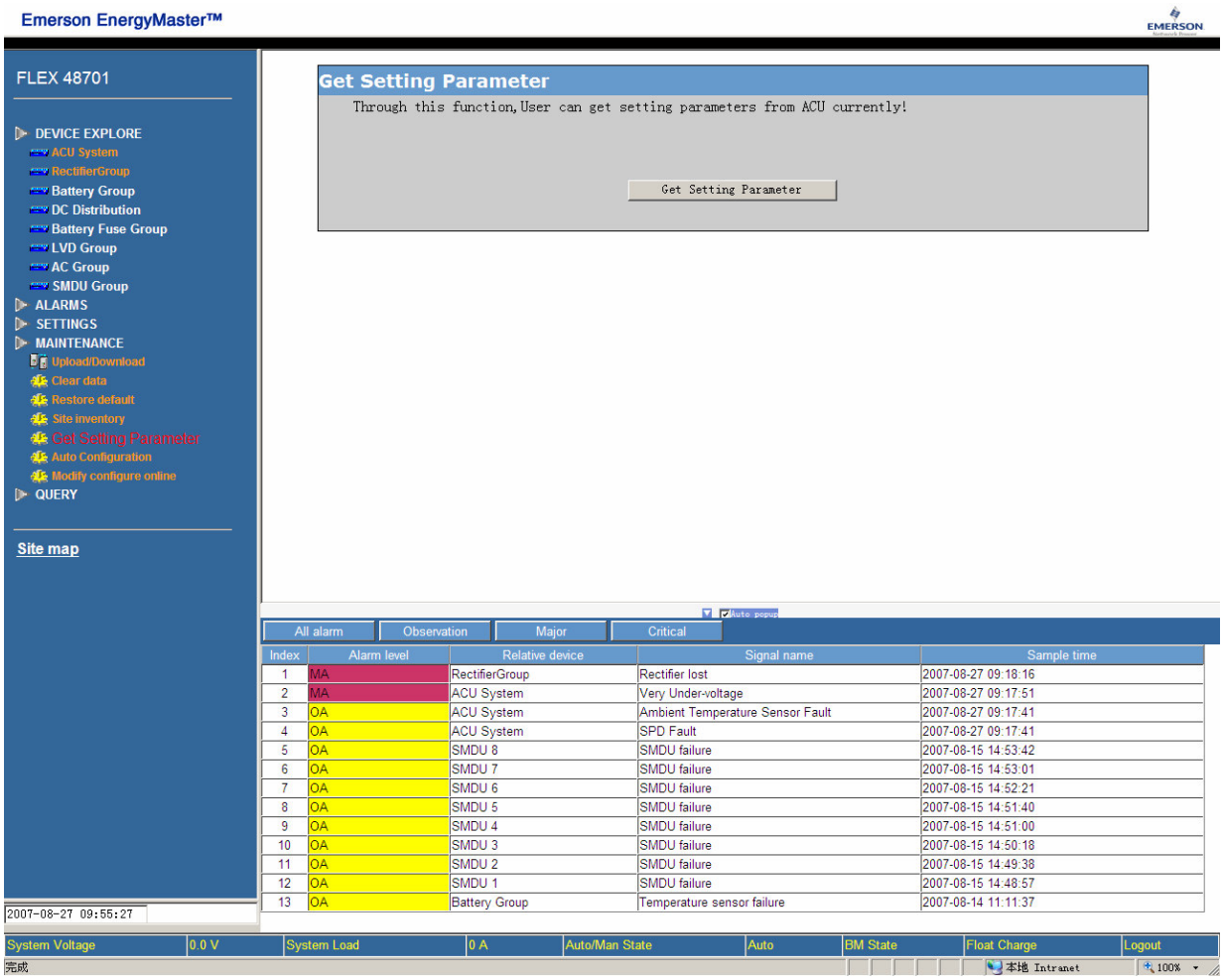


Figure 5-38 Get Setting Parameter

User can click the button of [Get Setting Parameter] to get the setting parameter of M800D monitoring module.

Click the sub-menu of “Auto Configuration”, following screen pops up:

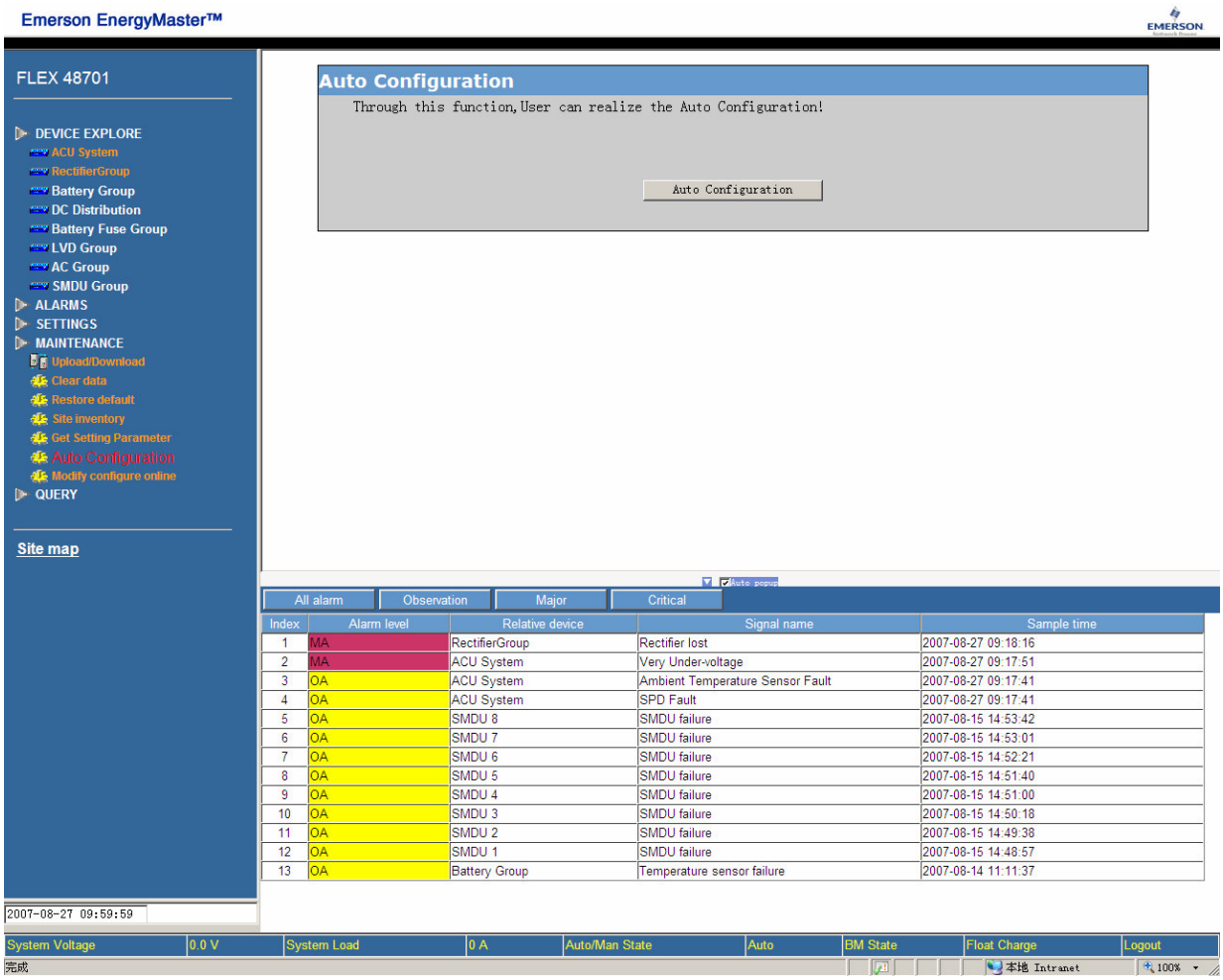


Figure 5-39 Auto Configuration

User can click the button of [Auto Configuration] to start the process of auto configuration.

Click the sub-menu of “Modify configure online”, and then click the button of “Modify M800D” to pop up following screen:

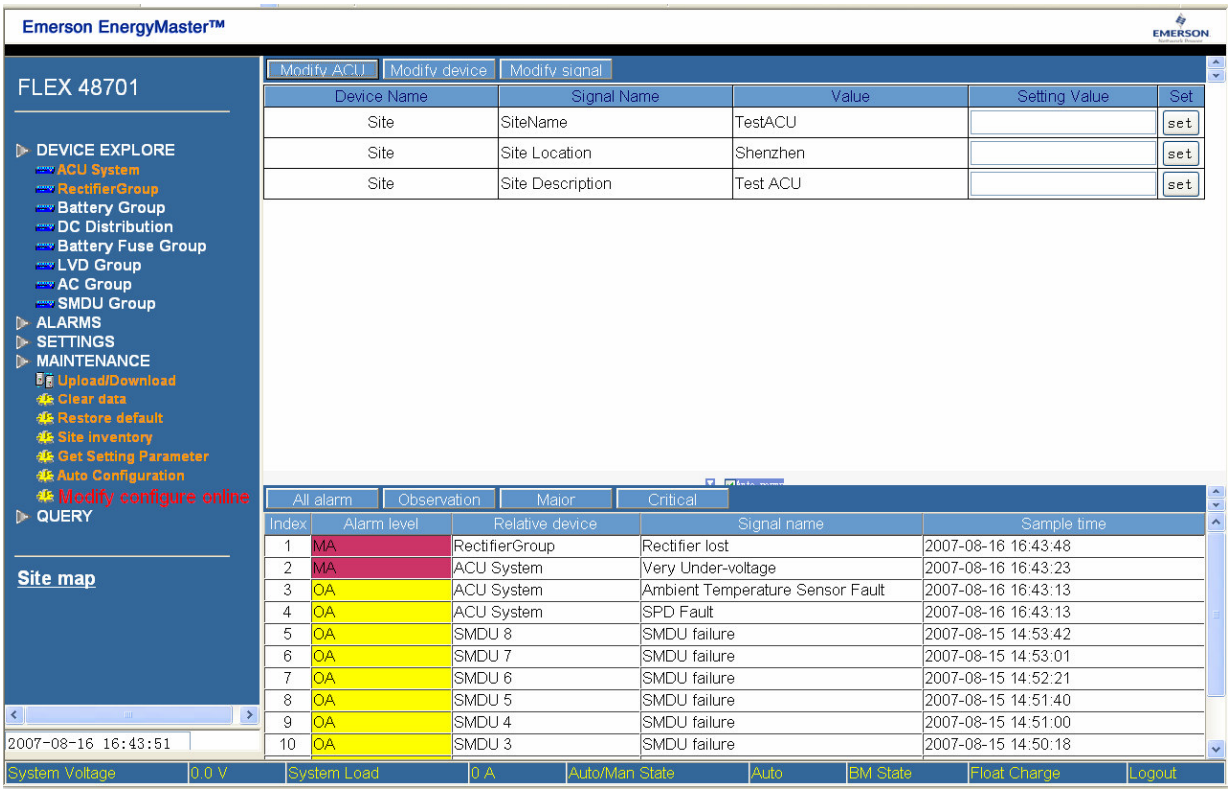


Figure 5-40 Modify M800D information

In the screen shown in Figure 4-40, user can modify the information of M800D such as the site name and site location.

In the screen shown in Figure 4-40, user can click the button [Modify device], following screen pops up:

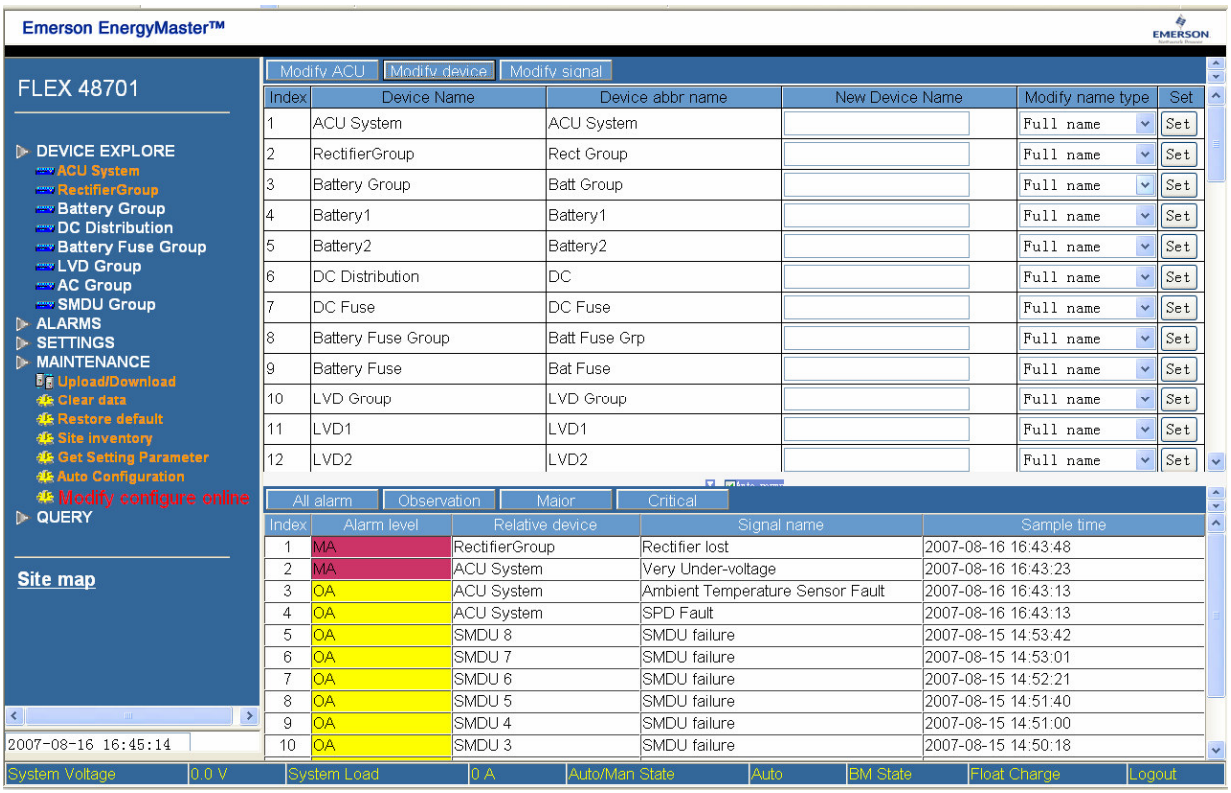


Figure 5-41 Modify device

In the screen shown in Figure 4-41, user can modify the device name. All entering the new device name, click “Set” to validate the change.

The characters of the device name and signal name can be English letters, digits, space, and underline. Other characters are illegal.

Click the button of “Modify signal”, following screen pops up:

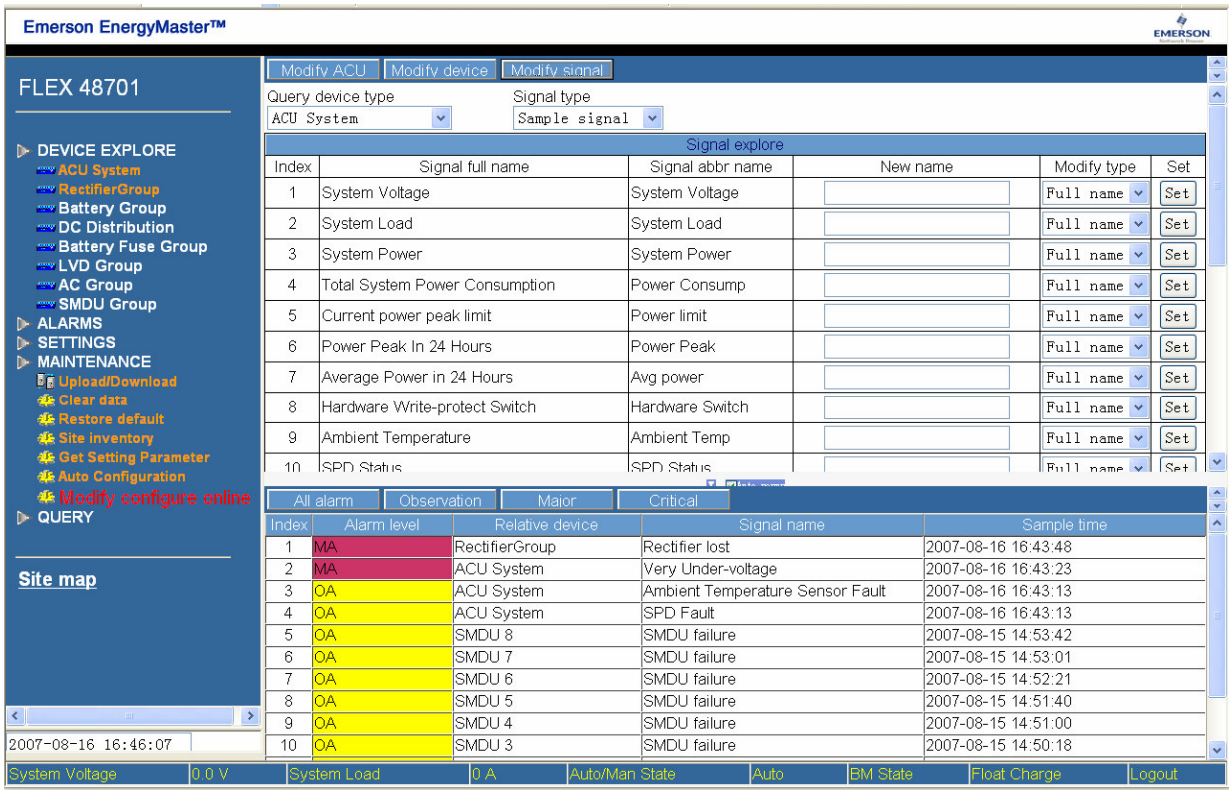


Figure 5-42 Modify signal

User can modify the signal name in the screen shown in Figure 4-42. After the entering the new signal name, click “Set” to validate the change.

5.3.8 Query

Click the menu of “Query”, and then click “History data” following screen pops up:

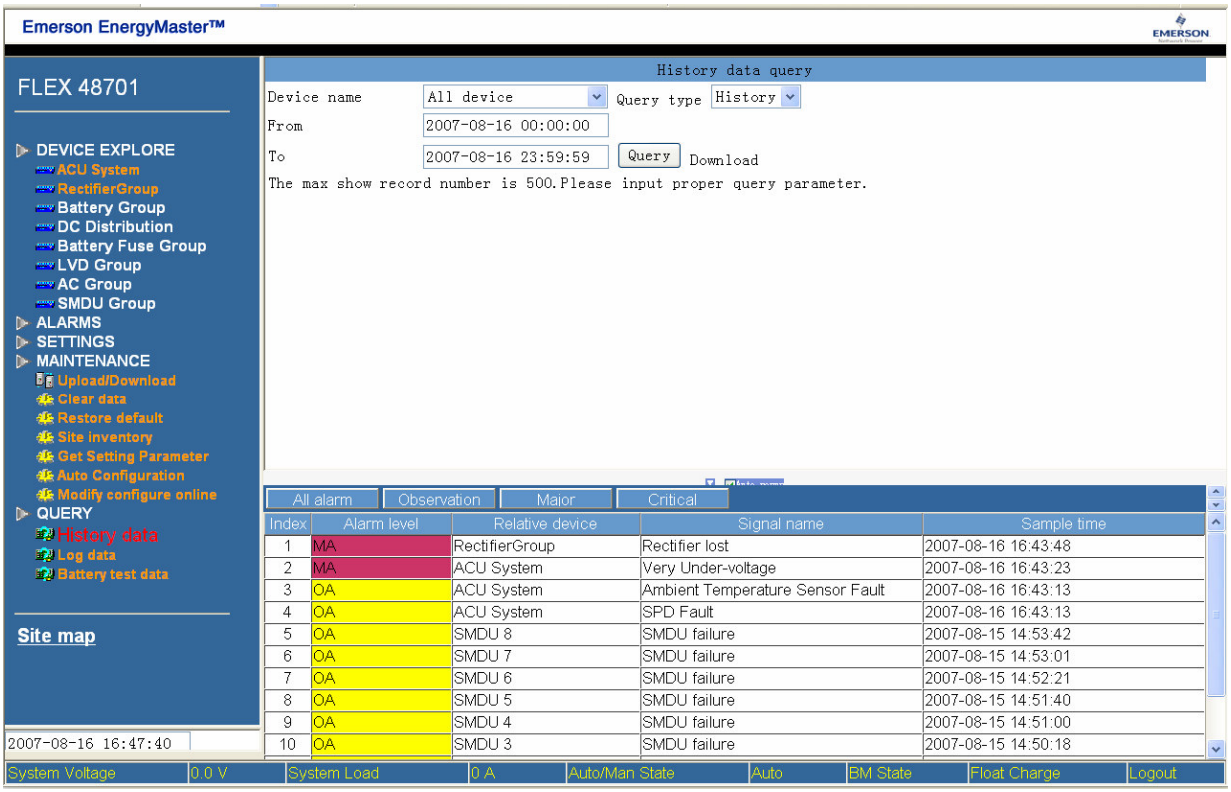


Figure 5-43 Query history data screen

In the screen shown in Figure 4-43, select the device (for example select “M800D System”, enter the start time and end time, and then click the button [Query] to query the data during this period.

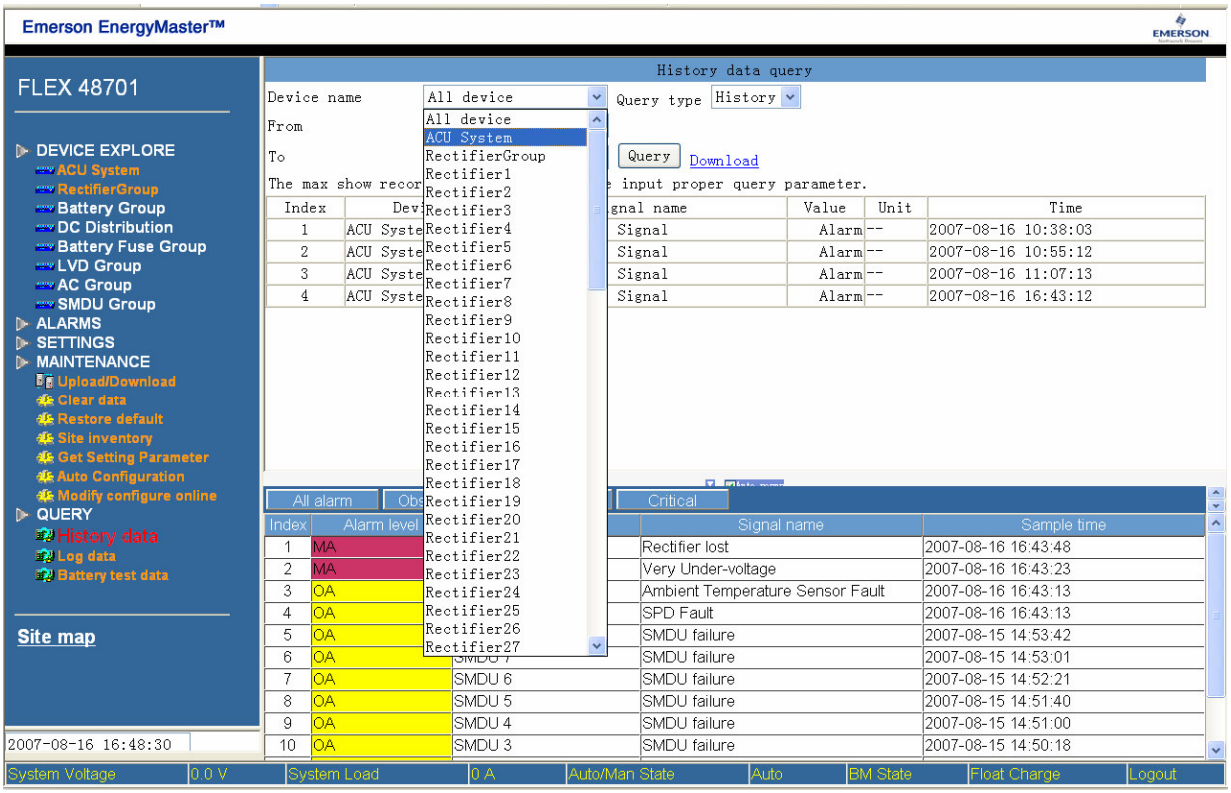


Figure 5-44 Query history data

Click the button “Log” to pop up the following screen:

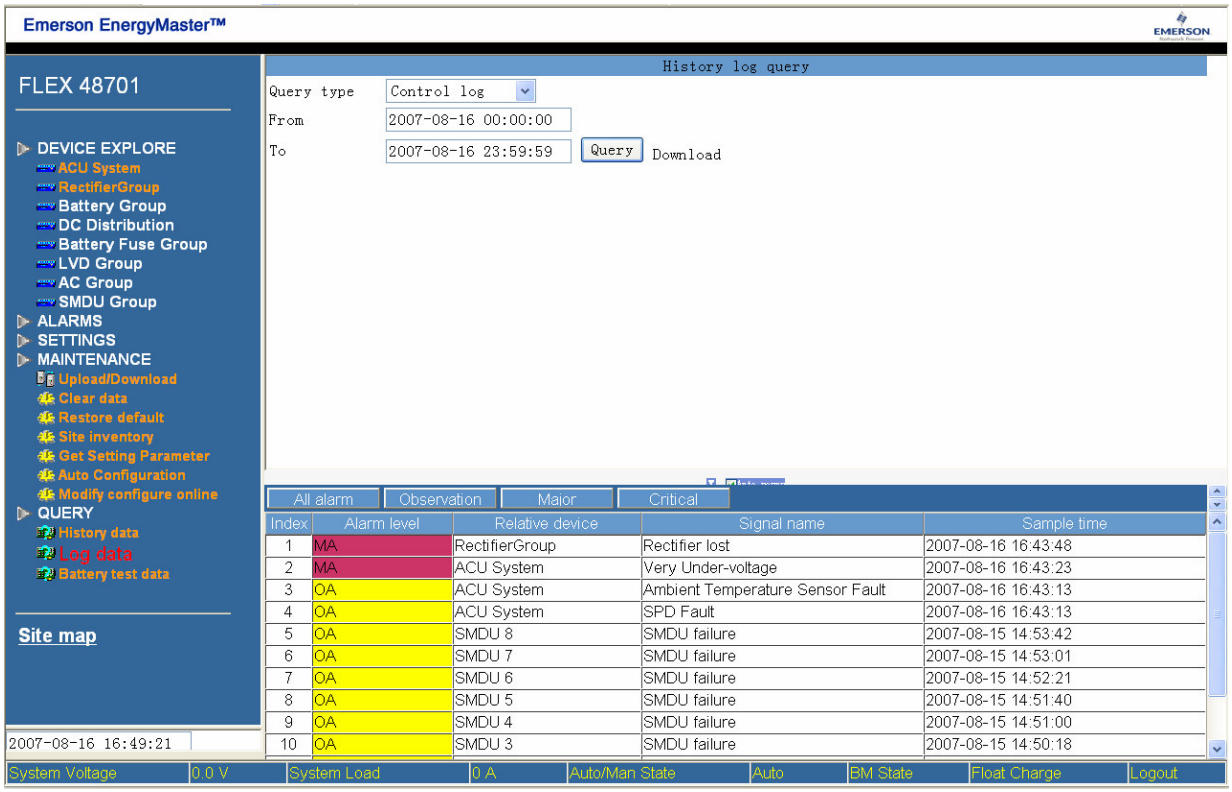


Figure 5-45 Query log screen

In the screen shown in Figure 4-45, select query type first, enter the start time and end time (for example from 00:00:00 June 21, 2005 to 23:59:59 June 29, 2005), then the log recorded from 00:00:00 June 21, 2005 to 23:59:59 June 29, 2005 will be displayed as shown in Figure 4-46.

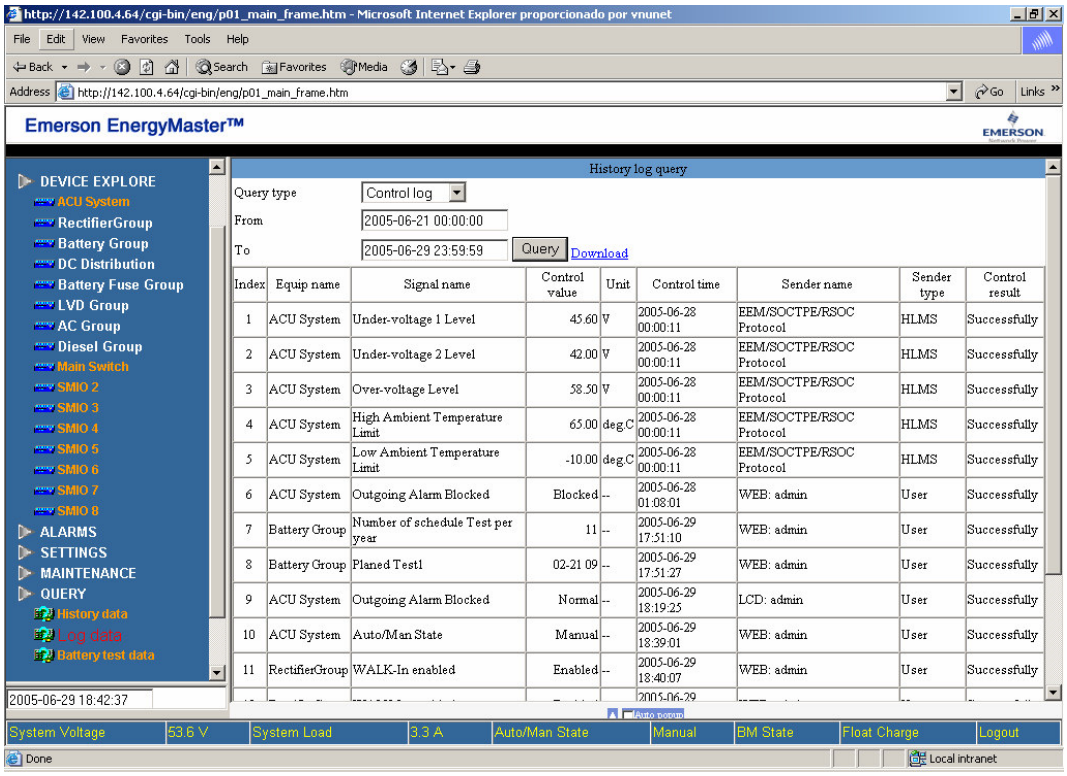

http://142.100.4.64/cgi-bin/eng/p01_main_frame.htm - Microsoft Internet Explorer proporcionado por vnunet
Emerson EnergyMaster™
EMERSON
DEVICE EXPLORE
ACU System
RectifierGroup
Battery Group
DC Distribution
Battery Fuse Group
LVD Group
AC Group
Diesel Group
Main Switch
SMIO 2
SMIO 3
SMIO 4
SMIO 5
SMIO 6
SMIO 7
SMIO 8
ALARMS
SETTINGS
MAINTENANCE
QUERY
History data
Log data
Battery test data
2005-06-29 18:42:37
History log query
Query type
Control log
From
2005-06-21 00:00:00
To
2005-06-29 23:59:59
Query
Download
Index Equip name Signal name Control value Unit Control time Sender name Sender type Control result
1 ACU System Under-voltage 1 Level 45.60 V 2005-06-28 00:00:11 EEM/SOCTPE/RSOC Protocol HLMS Successfully
2 ACU System Under-voltage 2 Level 42.00 V 2005-06-28 00:00:11 EEM/SOCTPE/RSOC Protocol HLMS Successfully
3 ACU System Over-voltage Level 58.50 V 2005-06-28 00:00:11 EEM/SOCTPE/RSOC Protocol HLMS Successfully
4 ACU System High Ambient Temperature Limit 65.00 deg.C 2005-06-28 00:00:11 EEM/SOCTPE/RSOC Protocol HLMS Successfully
5 ACU System Low Ambient Temperature Limit -10.00 deg.C 2005-06-28 00:00:11 EEM/SOCTPE/RSOC Protocol HLMS Successfully
6 ACU System Outgoing Alarm Blocked Blocked -- 2005-06-28 01:08:01 WEB: admin User Successfully
7 Battery Group Number of schedule Test per year 11 -- 2005-06-29 17:51:10 WEB: admin User Successfully
8 Battery Group Planed Test1 02-21 09 -- 2005-06-29 17:51:27 WEB: admin User Successfully
9 ACU System Outgoing Alarm Blocked Normal -- 2005-06-29 18:19:25 LCD: admin User Successfully
10 ACU System Auto/Man State Manual -- 2005-06-29 18:39:01 WEB: admin User Successfully
11 RectifierGroup WALK-In enabled Enabled -- 2005-06-29 18:40:07 WEB: admin User Successfully
System Voltage
53.6 V
System Load
3.3 A
Auto/Man State
Manual
BM State
Float Charge
Logout
Done
Local intranet

Figure 5-46 Control log

Click the button “Battery test data”, and the following screen pops up:

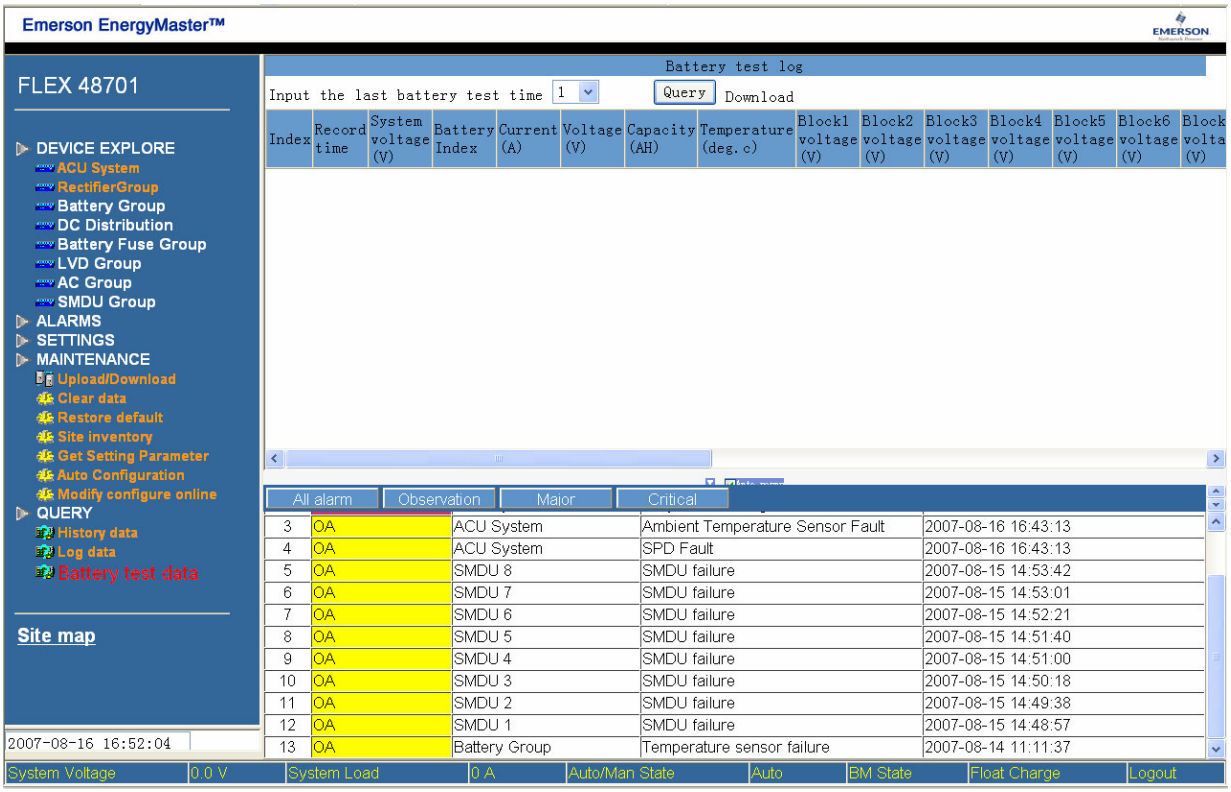


Figure 5-47 Query battery test data

In the screen shown in Figure 4-47, enter the last battery test time first, and then click query to query the battery test data.

All the queried data can be down loaded and saved in a text file by clicking the “Download” button.

5.4 Access M800D Through NMS

M800D has SNMP agent function. The user can use NMS to do the three following operations:

- Query the operation status and input/output signals of the device connected to M800D.
- Set the operation parameters of the device connected to M800D.
- Browse the active alarms.

When M800D generates alarms, SNMP agent can notify the preset NMS through TRAP automatically.

1.1.1 NMS Supported By SNMP Agent

The SNMP agent of M800D supports SNMPv2c.

All the NMS that supports SNMPv2c can be used to access M800D. The NMS includes HP OpenView, IBM NetView, Novell ManageWise, SunNet Manager and so on.

5.4.1 MIB Installation

MIB installation

The M800D MIB is located in the installation CD delivered together with M800D, and file name is M800D-power.mib.

Use the MIB loading function of NMS to load the MIB database, refer to the corresponding NMS user manual for the detailed loading method.

Contents of MIB

This MIB is suitable for the firmware version 1.10 of M800D. The MIB will change with the upgrading of M800D firmware. The contents of MIB supported by M800D SNMP agent, and the OID are listed in Table 4-4. For the details, please refer to the file of M800D-power.mib.

Table 5-4 Contents of M800D MIB

Ident group	M800D ident group	R/W*
identManufacturer	The name of the equipment manufacturer	R
identModel	The manufacturers model designation of the power system	R
identControllerFirmwareVersion	The firmware (software) version of the controller	R
identName	The name of the power plant. This object should be set by the administrator	R/W
System Group	M800D system value group	
systemStatus	Status of the complete plant (highest alarm). One of (1) unknown – status has not yet been defined (2) normal – there are no activated alarms (3) warning – OA, lowest level of 'abnormal' status (4) minor – A3 (5) major – MA (6) critical – CA, highest level of 'abnormal' status (7) unmanaged (8) restricted (9) testing (10) disabled	R
systemVoltage	System voltage, stored as mV	R
systemCurrent	System current, stored as Ma	R
systemUsedCapacity	Used capacity, stored as % of the total capacity	R
psStatusCommunication	The status of communication with the Power System (1) unknown, (2) normal, (3) interrupt indicates some errors occurred between Power System and agent	
psStatusBatteryMode	The status of battery modes, (1) unknown (2) FloatCharging, (3) ShortTest, (4) BoostChargingForTest (5) ManualTesting, (6) PlanTesting, (7) ACFailTesting, (8) ACFail, (9) ManualBoostCharging, (10)AutoBoostCharging, (11)CyclicBoostCharging, (12)MasterBoostCharging, (13)MasterBatteryTesting	
SM series group	Power system battery group	
psSMACNumber	The number of SM AC module	R
psSMBATNumber	The number of SM BAT module	R
psSMIONumber	The number of SM IO module	R
psInput group	Power system input group	
psInputLineAVoltage	The AC line A voltage, stored as mV	R
psInputLineBVoltage	The AC line B voltage, stored as mV	R
psInputLineCVoltage	The AC line C voltage, stored as mV	R
psTemperature Group	Power system temperature group	
psTemperature1	The first route temperature, stored as 0.001 Celsius degree	R
psTemperature2	The second route temperature, stored as 0.001 Celsius degree	R
alarm trap Group	M800D alarm trap Group	
alarmLastTrapNo	The sequence number of last submitted alarm trap	R
alarmTrapTable (alarmTrapEntry)	Table holding information about the submitted alarm traps. AlarmTrapEntry is the entry (conceptual row) in the alarmTrapTable	R
alarmTrapNo	The unique sequence number of this alarm trap	R
alarmTime	Date and time when event occured (local time), including timezone if supported by controller	R
alarmStatusChange	The type of alarm change. One of (1) activated (2) deactivated	R
alarmSeverity	The severity of the alarm. One of (3) warning – O1, lowest level of alarm severity (4) minor – A3 (5) major – A2 (6) critical – A1, highest level of alarm severity	R

alarmDescription	Free-text description of alarm	R
alarmType	Alarm type, i.e. an integer specifying the type of alarm	
Traps	Alarm traps info	
	The SNMP agent can send the active alarms to the specified NMSs and the user can define the lowest severity of the NMS accepted alarms	
Note*: R means OID is read-only (GET). W means OID is writable. R/W means OID can be read and modified (GET/SET)		

5.4.2 Access M800D through NMS

The following part introduces how to access M800D with HP OpenView as an example.

Apply administrative authority

In order to use NMS to manage the devices connected to M800D, the administrative authority needs to be applied for the NMS, that is, add the NMS information to the access list of SNMP agent.

Add NMS through Web browser

Refer to *5.3.6 Settings* for the method of adding NMS.

5.5 Parameter Setting Guidance

5.5.1 Rectifier Parameters

M800D monitoring module could work with MINI/SMALL/MEDIUM/LARGE capacity rectifiers. For each type of rectifiers, the following parameters should be set correctly.

Table 5-5 Rectifier Type Related Parameters

Parameter	Range	Default	Step change
Rated Current	NA	50	
Rectifier Power type	Double Single Small	Double	
AC phases	Single phase Three phases	Single Phase	

Rated Current should be set according to the actual power of rectifier. Rectifier power and AC phases should be set according to the following table:

Table 5-6 Rectifier power and AC phases

Capacity type (model)	Rectifier Power type	AC phases
MINI (R48-800, R48-400)	Single phase	Single
SMALL (R48-1800, R48-1800A)	Single phase	Small
MEDIUM (R48-2900U, R48-3200)	Single phase	Double
LARGE (R48-5800)	Three phases	Double

5.5.2 Battery Management Parameters

Battery test parameters

Table 5-7 Battery test parameters

Parameter	Range	Default	Step change
Constant Current Test Enabled	Yes/No	No	-
Planned Test Enabled	Yes/No	Yes	-
Date of Planned tests		Jan 1, 0 O'clock Apr 1, 0 O'clock Jul 1, 0 O'clock Oct 1, 0 O'clock	
Mains Failure Test Enabled	Yes/No	Yes	

Parameter	Range	Default	Step change
Short Test Enabled	Yes/No	Yes	-
Max Difference Current For Short Test	0 to 1.0 C_{10}	0.05 C_{10}	0.01
Short Test Duration	1 to 30 min	5 min	1 min
Test End Time	10 to 1440 min	180 min	10 min
Test End Voltage	-43 to –50V	-45.2V	0.1V
Test End Capacity	30 to 100 %	30 %	1 %
Test Current (for Constant Current Test)	10 to 10000 A	10000 A	10 A
Short Test Start Condition	0 to 365 Days	30 Day	1 Day

1. Test End Voltage, Test End Time, and Test End Capacity:

The M800D has battery test function and can record 10 groups of battery test data. The test data can only be queried through MC. First, the user starts the battery test manually, the M800D regulates the rectifier output voltage according to the setting of “Test End Voltage” to make the rectifier output voltage be lower than the battery voltage, and then the battery starts to discharge. If the battery voltage reaches the setting of “Test End Voltage” or the battery discharging time reaches the setting of “Test End Time” or the battery capacity reaches the setting of “Test End Cap”, the M800D will stop the battery test and regulate the rectifier output voltage to normal Float Charge Voltage. The rectifier then starts to charge the battery and the DC Power System transits to battery auto management mode. Meanwhile, the M800D will record the battery test start/end time, battery test voltage and battery remaining capacity in the battery test log. The user can query the test log from the M800D through MC.

During battery test, if the DC Power System has a fault, the M800D will stop the battery test automatically.

2. Planned Test Enabled

“Planned Test” means the M800D starts the battery test in a specific schedule.

Table 5-8 Alarm for battery test

Default category	LED	Alarm number	Alarm name
OA	Y	081	Battery test in progress
OA	Y	082	Short Test in progress
OA	Y	083	Test End for Voltage
OA	Y	072	Discharge Current Imbalance

Boost charging parameters

Table 5-9 Boost charging parameters

Parameter	Range	Default	Step change
Automatic Boost Charge Enabled	Yes/No	No	-
Cyclic Boost Charge Enabled	Yes/No	No	-
Nominal Voltage	48V: -53 ~ 59.5V	-53.5V	0.1V
Boost Voltage	48V: -53 ~ 59.5V	-56.4V	0.1V
Maximum Boost Charge Time	1 to 100 h	12 h	1 h
FC to BC Current	0.05 to 0.08 C_{10}	0.06 C_{10}	0.001 C_{10}
FC to BC Capacity	1 to 100%	80%	1
BC to FC Current	0.005 to 0.05 C_{10}	0.01 C_{10}	0.001 C_{10}
BC to FC Delay	0 to 600 min	180 min	10 min
Cyclic Charge Interval	2 to 365 days	180 days	1 day
Cyclic Charge Duration	180 to 720 min	300 min	1 min

1. Automatic Boost Charge Enabled

When “Auto BC Enable” is enabled, DC Power System will start boost charge to the battery when the system meets the boost charge conditions.

2. FC to BC Capacity and FC to BC Current

When battery capacity downs to the setting of “TO BC Capacity” or the battery current reaches the setting of “To BC Current”, M800D will control the DC Power System to make it start boost charging to the battery. The battery charging voltage is the setting of “BC Volt”(Boost Charge Voltage).

Table 5-10 Alarms for boost charging

Default category	LED	Alarm number	Alarm name
OA	Y		Cyclic Boost Charge
OA	Y		Automatic Boost Charge
OA	Y		Manually Boost Charge
OA	Y		Abnormal Battery Current

Temperature compensation parameters

Table 5-11 Parameter and alarm for temperature compensation

Parameter	Range	Default	Step change
Compensation Factor	0 to 2500mV/ °C	72mV/ °C	1mV/ °C
Nominal Temperature	20 to 25°C	25°C	1°C
Default category	LED	Alarm Number	Alarm name
OA	Y		Temperature Compensation Active

Temperature Compensation Coefficient

The setting range of temperature compensation coefficient is 0 to 2500mV/℃ and it should be set according to the actual battery parameter.

The battery is sensitive to the change of ambient temperature. In order to ensure the battery capacity and life, when ambient temperature changes, the battery float charge voltage also changes. The Float Charge Voltage is the normally the voltage when the room temperature is 25℃. The higher the ambient temperature is, the lower the Float Charge Voltage is, and vice versa. For the battery with 2 V battery cells, the Float Charge Voltage for every cell will be decreased by 3 to 7mV when the ambient temperature is increased by every 1℃. Therefore, the “Compensation Factor” for 48V battery shall be set to 72mV to 168mV, and the “Compensation Factor” for 24V battery shall be set to 36 to 84mV/℃.

Charging current limitation parameters

Table 5-12 Charging current limitation parameters

Parameter	Range	Default	Step change
Maximum Charging Current	0.5 C_{10} (battery capacity)	0.1C_{10}	0.01
Lower consumption during high cost hours enabled	Yes/No	No	N/A
Prohibit Battery Charge during Hi-cost hours	Yes/No	No	N/A
Default category	LED	Alarm Number	Alarm name
OA	Y		Battery Current Limitation Active

Parameters of low voltage disconnection

Table 5-13 Parameters of low voltage disconnection

Parameter	Range	Default	Step change
Load LVD Enabled	Yes/No	No	-
Battery LVD Enabled	Yes/No	No	-
Reconnection Voltage	-40 to -60V	-52.5V	0.1V
Load LVD Voltage	-40 to -50V	-43.2V	0.1V
Battery LVD voltage	-40 to -50V	-43.2V	0.1V
Load LVD time	0 ~ 6000 min	300 min	1 min
Battery LVD time	0 ~ 6000 min	300 min	1 min

LLVD: The M800D disconnects the LLVD contactor, thus the non-priority load controlled by the contactor will be powered off so that the battery can power the priority load longer. If the “LLVD Enable” is set to “Yes”(factory setting), monitoring module will enable the auto LLVD function.

BLVD: The M800D disconnects the BLVD contactor. Thus the battery will not continue to power the load so as to prevent its life from being reduced due to over discharging. If the “BLVD Enable” is set to “Yes”(factory setting), monitoring module will enable the auto BLVD function.

Parameters of capacity predication

Table 5-14 Parameter of capacity prediction

Parameter	Range	Default	Step change
Battery Type No.	1 to 10	1	1
Rated Capacity	50 to 5000 Ah	1000	10
Over Current	0.3 to 1.0 C_{10}	0.30 C_{10}	0.01
Current Limit	0.10 to 0.25 C_{10}	0.10 C_{10}	0.01
Capacity Coefficient	10 to 100 %	96 %	1
Discharge Curve	10 of discharge time for 0.1 to 1.0 C_{10} discharge current		

5.5.3 Energy Management Parameters

Parameters of lower consumption during high cost hours

Table 5-15 Parameter and alarm for lower consumption during high cost hours

Parameter	Range	Default	Step change
Lower consumption during high cost hours enabled	Yes/No	No	N/A
Prohibit Battery Charge Enabled	Yes/No	No	N/A
Default category	LED	Alarm Number	Alarm name
OA	Y		Battery Charge Prohibited Alarm

Parameter and alarm for maximum power consumption

Table 5-16 Parameter and alarm for maximum power consumption

Parameter	Range	Default	Step change
Maximum Power Consumption Limit Enabled	Yes/No	No	N/A
Battery Discharge Enabled	Yes/No	No	N/A
Default category	LED	Alarm Number	Alarm name
OA	Y	121	Over maximum power alarm

Rectifier redundancy parameters

Table 5-17 Parameter and alarm for redundant rectifier switch ON/OFF

Parameter	Range	Default	Step change
Rectifier Redundancy Enabled	Yes/No	No	N/A
Min Redundancy	1 to Max Redundancy – 110	100	10
Max Redundancy	111 to 4800	300	10
Switch Off Delay	1 to 60min	5min	1min

Rectifier cycling parameters

Table 5-18 Parameter and alarm for rectifier cycling

Parameter	Range	Default	Step change
Cycle Period	1 to 500 Days	30	1
Cycle Activation Time	0 to 23 o'clock	3 o'clock	1

5.5.4 Diesel Management Parameters

Parameter and alarm for diesel test

Table 5-19 Parameter and alarm for diesel test

Parameter			Range	Default	Step change
Schedule Diesel Test Enabled			Yes/No	No	N/A
Date of Schedule Diesel Test				Jan 1, 0 O'clock Apr 1, 0 O'clock Jul 1, 0 O'clock Oct 1, 0 O'clock	
Default category	LED	Alarm Number	Alarm name		
OA	Y		Diesel test in progress (Manual, or cyclic)		
CA	RED		Diesel Generator Fault		

5.5.5 Power Split Parameters

Table 5-20 Parameters of power split

Parameter	Range	Default	Step change
Power Split Mode	Master/Slave	Master	-
Current Limit Set Value	10 to 90%	60	1
Delta Voltage	0.1 to 2 V	0.5	0.1
Proportional Coefficient	0 to 10	2	0.1
Integral Time	1 to 2000 s	20	1

Chapter 6 Use Of Monitoring Module M501D

This chapter introduces the front panel and functional keys briefly, and expounds screen contents, access method, system controlling, information querying and parameter setting.

6.1 Front Panel

There are backlit LCD display, functional keypad, indicators and positioning pin on the front panel of M501D monitoring module, as shown in the following figure:

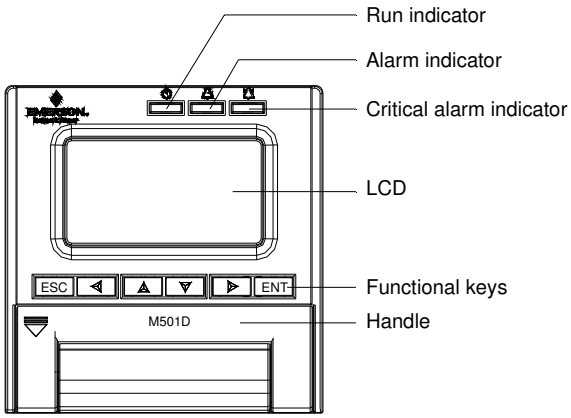


Figure 6-1 Front panel of M501D monitoring module

Description of the indicators on the front panel is in the following table:

Table 6-1 Monitoring module indicator description

Indicator	Normal state	Fault state	Fault cause
Run (green)	On	Off	No operation power supply
Alarm (yellow)	Off	On	There are observation alarms
Critical alarm (red)	Off	On	There are major or critical alarm

M501D monitoring module uses a 128 % 64 LCD, a keypad with six keys. The interface language is Chinese, English, Spanish, Portuguese, Italian and French optional. The front panel is easy to remove and replace.

Table 6-2 Description of monitoring module keypad

Key	Function
ESC	Return to the upper level menu
ENT	Enter the main menu or confirm the menu operation
'▲' and '▼'	Shift among parallel menus. For a character string, these 2 keys can be used to shift among different options
'◀' and '▶'	Change values at a value setting interface. For a character string, these 2 keys can move the cursor left or right

6.2 Power On Order

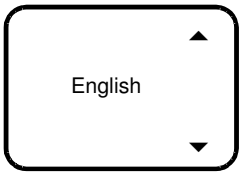
After the system is powered on for the first time, you should set the system type according to the actual configuration. The monitoring module will restart after the system type is changed. In that case, you should re-configure those parameters whose factory setting values are inconsistent with the actual situation. Only after that can the monitoring module operate normally.

After configuring the system parameters, you can carry out various operations directly without resetting the parameter values. As for those important parameters related to battery management, such as BLVD, you should be fully aware of their influence upon the system before you change their values.

Note

For the exact meanings of the abbreviations used in LCD displayer, see *Appendix 4 Glossary.*

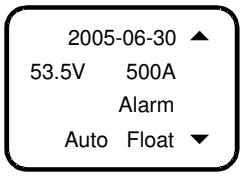
1. The LCD will prompt you to select a language once the monitoring module is powered on.



You can use ◄, ►, ▲ or ▼ to select the language you want, and press ENT to confirm. If the user does not press any key for 10 seconds, the monitoring module will select automatically the current language.

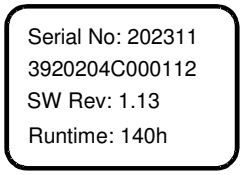
2. The monitoring module will prompt you to wait, and start initialization.

3. The first system information page appears

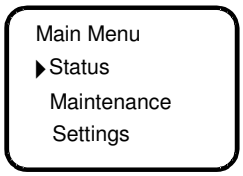


The system information is shown in many pages. You can repeatedly press ▼ to view other system information pages in a cycle.

4. Press the ESC key at the information root screen, and the user can browse the serial number of the module, the software version and the operation time of the module.



5. At any system information page, press ENT to enter the 'MAIN MENU' page, which contains 3 sub-menus: 'Status', 'Maintenance' and 'Settings'.



You can press ▲ or ▼ repeatedly to select a sub-menu, and press ENT to enter the sub-menu. Press ESC to return to the menu of higher level.

Status

Including rectifier information, active alarm information and alarm history information.

1) Maintenance

The maintenance operation can be conducted only when the battery management mode is set to 'Manual'. The maintenance includes battery FC, BC and test, load power off/on, battery power off/on and rectifier voltage trimming, current limit, switch control and resetting.

2) Settings

Including the setting of alarm parameter, battery parameter, AC/DC parameter, rectifier parameter and system parameter.

6.3 Querying System Status

6.3.1 First Page Of System Information

At the main menu page, press ESC to return to the first system information page.

If no operation is conducted on the monitoring module keypad for 8 minutes, the LCD will return to the first system information page and shut down the back light to protect the screen. Pressing any key will turn on the backlight.

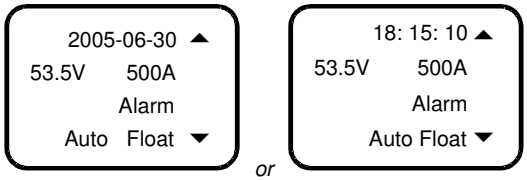
The first system information page contains the major system operation information, including date/time, busbar voltage, total load current, system operation state (normal or alarm), battery management mode (AUTO or MANUAL) and battery state.

The current time is divided into two screens and displayed alternatively every two seconds: one screen displaying the year, month and day, another screen displaying hour, minute and second. Year is displayed in 4-digit number, other time units are displayed in 4-digit numbers.

In the system indirectly measuring the total load current, the load current represents the sum of the module output current and battery output current.

The energy management mode includes manual mode and auto mode, which can be changed through battery parameter setting. Under manual mode, if the bus voltage is lower than the DC voltage alarm threshold, the system will switch to the auto battery management mode.

The battery status includes float charge, boost charge, cyclic boost charge, test, fast test and timed test.



Note

In this screen, the user can adjust the LCD contrast (7 levels in total) through the ◄ and ► keys.

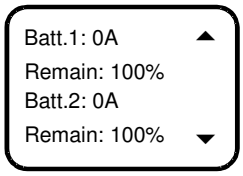
In this screen, the user can view the module serial number, software version number and running time through the ESC key.

If there is no operation on the monitoring module in 8 minutes after the last key pressing operation, the display screen will automatically return to the root screen of the information screen, the back light will be switched off, and the monitoring module will record the return time, which can be viewed through the background tool.

6.3.2 Other System Information Pages

The system information is shown in many pages. The default page of the monitoring module after the system power on is the system information first page. You can press ▲ or ▼ to scroll up or down to view more operation information, as shown in the following page:

Battery information page



Battery 1, battery 2

These two items indicate the battery currents connected to battery shunt 1 and battery shunt 2 respectively. If the ‘Bat shunt’ of certain battery pack is set as ‘None’, the corresponding battery information screen will display ‘not connected’, and there is no display of the remaining capacity. If the system is not connected to the battery shunt, and the number of the battery packs is set as ‘0’, the relevant information will not be displayed.

Remaining capacity of battery

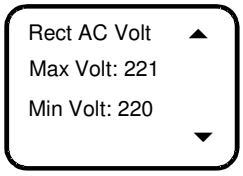
The monitoring module has the function of real time calculating the remaining capacity of the battery. The result is generally an estimate value. Through background configuration, the ‘remaining’ capacity of the battery may be

displayed in the form of capacity percentage, remaining Ah number and the remaining time. The default display is the capacity percentage, as shown in the above figure.

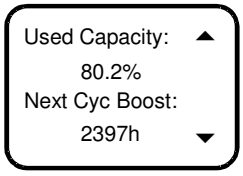
During the normal boost charge/float charge management, the monitoring module will take the nominal capacity of the single battery pack as the full capacity of the battery pack. During the discharge of the battery, the monitoring module will obtain the real time remaining capacity of the battery according to the detected discharge current and discharge time. During the charge of the battery, the monitoring module will obtain the remaining capacity of the battery by calculating the charged capacity according to the detected charge current and charge time. If the calculated remaining capacity of the battery is higher than the nominal capacity, the monitoring module will automatically calibrate the real time remaining capacity of the battery to be the nominal capacity.

AC information screen

The maximal and minimal voltage values of all the rectifier AC inputs for the power system will be displayed.

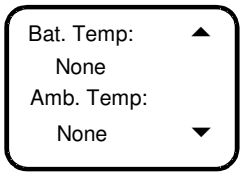


BC prompt page



If the monitoring module disables boost charge or boost charge is being conducted, '0h' will be displayed.

Temperature information screen



If the monitoring module has not been configured with the temperature sensor, the screen will not be displayed.

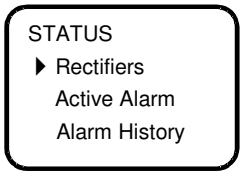
The temperature information detected by the temperature sensor will differ with different parameter configurations. For details about the parameter configuration, please refer to *6.7.3 Battery Settings*. If the temperature sensor has not been connected or fails in measurement, 'invalid' will be prompted.

6.4 Querying Rectifier Status

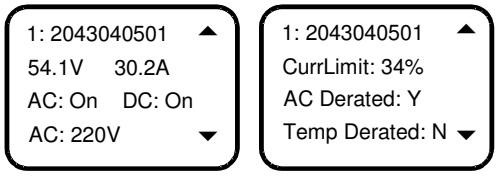
The module information includes the serial number of the rectifier, the voltage, current, current limiting threshold of each module, the AC/DC status of the switch, the module-limited power, and the temperature-limited power.

1. At any system information page, press ENT to enter the main menu.

2. Use ▲ or ▼ keys to select the 'Status' sub-menu in the main menu, and press ENT to confirm.



3. Use ▲ or ▼ to select the 'Rectifiers' submenu, as shown in the above figure. Press ENT to confirm.



The information of every rectifier is displayed in two pages. The information in the first screen includes: the last 10 digits of the serial number of the corresponding module, the output voltage, output current, the AC/DC switch status, the AC input voltage. The information in the second screen includes: the last 10 digits of the serial number of the corresponding module, the current limiting threshold, the AC power derated status, the temperature derated status. Press ► to scroll to the next page, or ◄ to return to the last.

4. Press▼ or ▲ to view other rectifiers' information.

The information of 48 modules can be displayed at most. If the module does not exist, no information will be displayed. If the communication of the module is interrupted, the information will be highlighted.

5. At any rectifier information page, press ESC repeatedly and you can return to the higher-level menus.

6.5 Querying And Handling Alarms

The monitoring module can locate and record the system fault according to the collected data, generate audio and video alarm and dry contact output according to the set alarm level, and report the alarm to the MC. Meanwhile, the user can query the alarm history record and active alarm record on the LCD of the monitoring module.

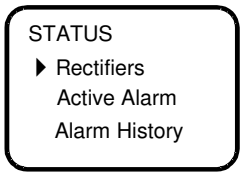
6.5.1 Querying Active Alarm

When a new alarm is raised, if there is no key pressing operation on the monitoring module, two minutes later, the monitoring module will automatically pop up the active alarm screen on the LCD.

If there exist multiple alarms in the system, the viewing steps are as follows:

1. At any system information page, press ENT to enter the main menu.

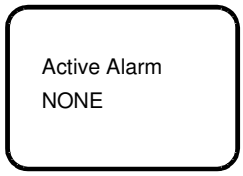
2. Use ▲ or ▼ to select the 'Status' submenu in the main menu and press ENT to confirm.



3. Use the ▲ or ▼ key to select the 'active alarm' submenu in the submenu screen, and press the ENT screen to confirm and run the active alarm information screen.

Press ▲ or ▼ to select the 'Active Alarm', as shown in the above figure, and press ENT to confirm.

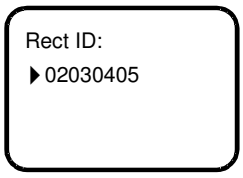
1) If there is no active alarm, 'Active Alarm None' will be displayed



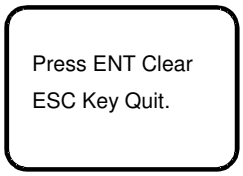
2) If there is active alarm, the screen will display the following information:

On the active alarm information menu, the display contents include; the alarm sequence number, alarm level, alarm name and time (year, month, day, hour, minute, and second). The display sequence will follow the sequence of the occurring time of the alarms. The latest alarm will be displayed as the first one. Use ▲ or ▼ to view all active alarms.

When querying the alarm of the rectifier, the user can press ► to display the last 10 digits of the serial number of the rectifier, and then the running indicator of the corresponding rectifier will flash.



In the case of battery test alarm or maintenance time alarm, press ► to display the prompt information.



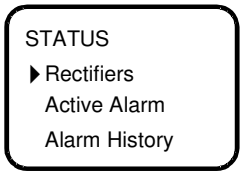
On the prompt screen, press ENT to confirm and clear the alarm.

4. At any active alarm information page, press ESC repeatedly and you can return to the higher-level menus.

6.5.2 Querying Alarm History

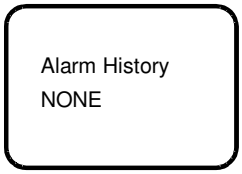
1. At any system information page, press ENT to enter the main menu.

Press ▲ or ▼ to select the 'Status' submenu, and press ENT to confirm.

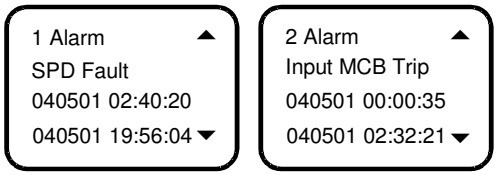


2. Use ▲ or ▼ to select the 'Alarm History', as shown in the above figure and press ENT to confirm.

If there is no historical alarm, the prompt will be 'Alarm History None'.



3. The historical alarms of the monitoring module are stored in cyclic order. Up to 200 alarms will be recorded. Above that, the earliest alarm will be cleared automatically.



At the monitoring module, the displayed historical alarm information includes: alarm serial No., alarm name and alarm start/end time (year, month, day, hour, minute, second).

If it is a rectifier that raised the alarm, the ID of that rectifier will be displayed.

4. At any Alarm History information page, press ESC repeatedly to return to the higher-level menus.

6.5.3 Changing Audio/Video Alarm And Alarm Callback

The monitoring module provides different audio/video alarms and alarm Callbacks for active alarms of different alarm levels, as show in Table 5-3.

Table 6-3 Different alarms and call back modes for different alarm levels

Alarm level	Alarm red indicator	Alarm amber indicator	Alarm loudspeaker	Alarm callback	Remarks
Critical alarm	On		On	Yes	Set Callback
Major alarm	On		On	Yes	Set Callback
Observation alarm		On	Off	No	
No alarm	Off	Off	Off	No	

Therefore, when the alarm levels of the alarms are changed, there will be different audio/video alarm and alarm callback.

Press any key of the monitoring module, and the alarm beeping will be silenced. If all the alarms have resumed normal, the alarm beeping will be silenced, and the alarm indicators will be off.

The user can flexibly set the alarm beeping time of the monitoring module and choose not to generate alarm beeping. For details, please refer to *6.7.2 Alarm Settings*.

6.5.4 Change Alarm Types Of Dry Contacts

As one of the alarm type parameter, 'Related Relay' refers to the serial No. of the dry contract corresponding to the alarm type, whose value is either 1 ~ 8 or 'None'. 'None' means there is no corresponding dry contact. For details, see *6.7.2 Alarm Settings*.

6.5.5 Programmable Setting On The Dry Contact Output Alarm Type

The PLC control is configure d by the background tool software.

The configuration method for the control function of the PLC is as follows: D＝A (Status) * B (Status) * C (Status)

D: Indicates the serial number of the dry contact corresponding to the output. Dry contacts 1~8 are available for selection.

A, B, C: indicate the input alarm type. Status is for judging whether the alarm has occurred.

*: indicates the logic relation between two types of alarms. 'and/ or' may be selected.

The alarm types available for selection are shown in the following table:

Alarm type		Alarm type		Alarm type
Alarms Blocked		DC Voltage		Non float work
Distr Fuse Fail		AC1 Phase A		Battery Discharge
Load NF1 Fail		AC1 Phase B		Curr Imbalance
Load NF2 Fail		AC1 Phase C		Short Test Error
Load NF3 Fail		AC2 Phase A		Battery Test Error
Load NF4 Fail		AC2 Phase B		LVD2
Load NF5 Fail		AC2 Phase C		LVD1
Load NF6 Fail		Load Current		Output Voltage Error
Prio Load1 Fail		Battery 1 Current		Mains Fault
Prio Load2 Fail		Battery 2 Current		Mult Rect Alarm
Prio Load3 Fail		Battery Fuse 1		Need Maintence
Digital1		Battery Fuse 2		Rect not Respond
Digital2		Battery Fuse 3		Rect AC Fail
Digital3		Battery Fuse 4		Rect Over Temperature
Digital4		Temperature Measure 1		Rect Failure
Digital5		Temperature Measure 2		Rect Protect
Digital6		Monitor Module Working		Rect Fan Failure
Digital7		Module Self-Check		Rect AC Derated
Digital8		Module Manual Manage		Rect Temperature Derated

For the detailed description about the PLC configuration method, please refer to the user's manual of the background Pctools.

6.6 Maintenance

Note

This operation can be conducted only when the battery management is set to 'Manual'.

The battery re-connection operation may cause load LVD accident. The user shall be prudent when conducting this operation!

The operation method is shown as follows:

1. Press ENT key on any information screen to enter into the 'Main menu' screen.

2. Press the ▼ key to select the 'Maintenance' menu.

You cannot enter the system Maintenance menu if the 'Battery Management' is set to 'Auto'.

3. Press ENT and input the correct operation password. Press ENT again to enter the 'Maintenance' menu.

To input the password, use ▲ or ▼ to modify numbers, and use ◄ or ► to move the cursor. After the input, press ENT to confirm.

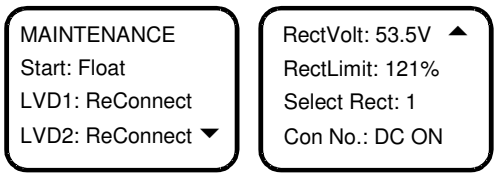
After inputting the correct password, the user can enter into the control screen. If the input password is wrong, the display screen will display 'password incorrect'.

Description

When entering into the 'Maintenance' screen, the user can select the user level password, engineer level password and manager password as the operation password. The operation authorities are of the same.

4. Press the ▲ or ▼ key to pop up the operation screen.

There are two screens:



5. Press ◄ or ► key to select the relevant actions.

'Start': The option includes the 'boost charge/float charge/test' of the battery pack. If the system has not been configure d with battery, or the battery has been powered off, the control is invalid. If the system has AC power-cut alarm or the bus voltage is too low, the system will not conduct the boost charge and battery test control. When the module communication is interrupted, the battery test control cannot be conducted. After the battery test is completed, the battery management mode will automatically change from 'manual' to 'auto'.

'LVD1': The item includes the load 'ReCoonect/DisConnect'.

'LVD2': The item includes the battery 'ReCoonect/DisConnect'. If the system has no battery, or the battery bypass is alarming or the battery is in the non-float charge state, the LVD2 control operation is invalid. The operations available

Only when the power system is in the float charge state can the following control on the rectifier be conducted.

The operations that function on all the modules include:

'RectVolt': The maximal range for the setting of the item (actually determined by the module operation parameter) is 42V to 58V, which can be used to improve the current sharing effect between the rectifiers. Please note that the 'module voltage adjustment' value cannot exceed the over-voltage alarm threshold of the module HVSD or be lower than the disconnection threshold LVD1. Otherwise, the control is invalid.

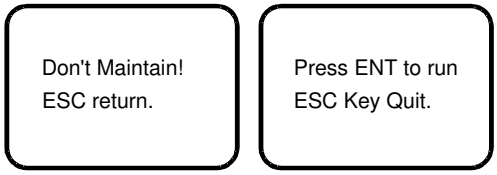
'RectLimit': The setting range is 10% ~ 121%.

The control operations for the single rectifier include: '**Con**' which comprises 'DC on/DC off/AC on/AC off/reset'. The operation method is as follows: 1) press ▲ or ▼ to select the 'module' parameter item, use the ◄ or ► key to

change the sequence number of the module, and then press ENT key to confirm. The bottom line of the display screen will display the last 10 digits of the serial number of the module. 2) Use the ▲ or ▼ key to shift the cursor to the control operation option block and select the suitable value with the ◄ or ► key.

If the rectifier is blocked upon over-voltage, the user can reset the rectifier with 'reset' operation.

6. There is confirmation information prompt for the control command. If the control command can be executed, the system prompts to press ENT for confirmation, and then the control action becomes valid, or the user can press the ESC key to abandon the operation. If the control conditions are not satisfied, the monitoring module will prompt that the control operation cannot be conducted.



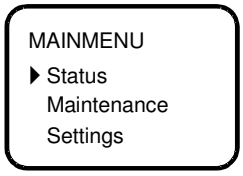
7. Press the ESC key on any Maintenance screen, the user can directly return to the 'main menu 4 system control output'. Repeatedly press the ESC key, the user can return to the root screen of the system information screen.

6.7 Setting System Parameters

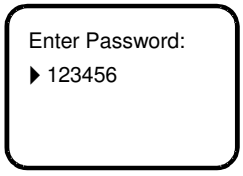
Battery parameters are very important, for they are related to the life of battery. Before delivery, the battery parameters have been initialized. Without any special needs, you only need to reset the battery group number and battery capacity, and accept the defaults for other parameters.

6.7.1 Parameter Setting Method

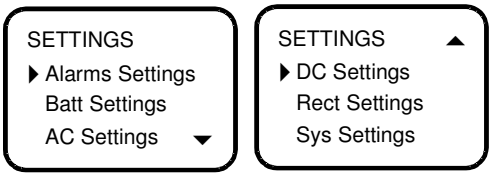
1. At any system information page, press ENT to enter the main menu.



2. Press ▲ or ▼ to select the submenu 'Settings' and press ENT to confirm. System will then prompt you to input the password.



3. Press ◄ or ► to select the number of password digits. Enter the password digit by digit using ▲ or ▼. Press ENT to confirm and enter the parameter setting submenu.



Users with different password levels are entitled to set different types of parameters or operation types, shown as follows:

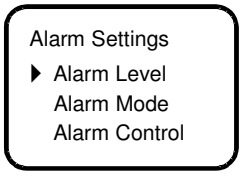
Table 6-4 Different password levels and revelant operation types

Level	Operation authority	Default password
User	Configuration of general parameters	1
Operator	User's authority, plus resetting system, resetting password and modifying system type.	2
Administrator	Operator's authority, plus modifying password of all levels, controling alarm sound volume, browsing system parameters that can be set only through the host	640275

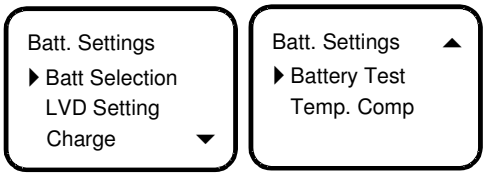
4. There are two pages of 'Settings'. Shift page by using ▼ or ▲, and select the parameter by using ▼ or ▲. Press ENT to confirm.

As shown in the above figure, the parameters are classified into 6 categories by the monitoring module, including alarm parameter, battery parameter, AC parameter, DC parameter, module parameter and system parameter.

The alarm parameters include three types: alarm level, alarm mode and alarm control, shown as follows:

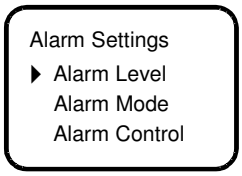


The battery parameters include five types: basic parameters, LVD protection, charge management, battery test, and temperature compensation coefficient. The setting interface is divided into two screens, as shown in the following:



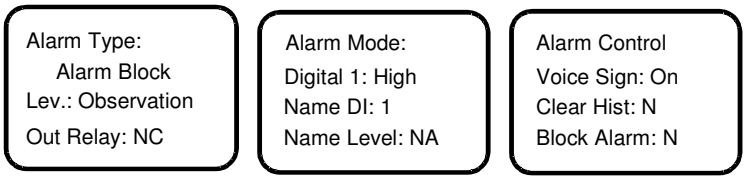
6.7.2 Alarm Settings

The root screen of the setting interface is as follows:



There are 3 submenus. Use ▼ or ▲ to select one, and use ENT to confirm.

The three submenus are shown below:



Use ▼ or ▲ to select one page or one of the parameters, and ◄ or ► to select the parameter value. Press ENT to confirm and save.

Description of alarm level parameter function and value

'Alarm type': To select different types of alarms. The alarm types are defined in the following table.

Table 6-5 Alarm type definition

No.	Alarm name	Alarm description	Default alarm level	Default associated relay	Associated setting parameters
1	Alarm blocked	To block the alarms sent to the MC. It functions in the EEM protocol	Observation alarm	N/A	Alarm blocked
2	Load bypass disconnected	Overload, short circuit, manual disconnection or alarm circuit fault	Critical alarm	6	
3	LVD1	Load disconnected Manual control of load LVD	Critical alarm	5	Load LVD enabled

No.	Alarm name	Alarm description	Default alarm level	Default associated relay	Associated setting parameters
4	Battery protect	During the discharge of the battery, when the battery voltage is lower than the set value of the 'battery protection' parameter or the discharge time exceeds the set value of the ' LVD2 protection time' parameter, the battery protection contactor will be automatically disconnected. Manual control of battery LVD	Critical alarm	4	Battery LVD enabled
5	Battery charge over-current	The charging current of battery pack 1 is larger than the set value of the parameter 'charging over-current threshold'.	Observation alarm	N/A	Battery charge over-current
6	Battery bypass disconnected	Overload, short circuit, manual disconnection or alarm circuit error	Critical alarm	N/A	
7	monitoring module fault	Hardware self-detection error	No alarm	N/A	monitoring module fault
8	Manual management of module	The monitoring battery management is in manual state	No alarm	N/A	
9	Battery non-float charge state	Including: auto boost charge, cyclic boost charge, constant current test, fast test	No alarm	7	Battery non-float charge state
10	Battery discharge	Battery is discharging.	No alarm	N/A	
11	System current unbalanced	In the system with shunt, there exists great difference between the collected load current plus the battery current and the module output current.	No alarm	N/A	
12	Fast test abnormal	During the fast test, the discharge capacity of two batteries is larger than the set value	Observation alarm	N/A	
13	Battery test abnormal	The battery discharge time is shorter than the estimated time	Observation alarm	N/A	
14	Output voltage abnormal	The control output voltage is different from the collected bus voltage, and different from the reported data of the module. The error is larger than 1V	Observation alarm	N/A	
15	AC power-cut	In the system with AC collection board: All the AC voltages are lower than 80V. Neither AC circuit 1 nor circuit 2 is in working state. In the system without AC collection board: The AC input of all the rectifiers is cut off. The AC input voltage of all the rectifiers is lower than the 'phase loss alarm' threshold	Critical alarm	1	AC power-cut
16	Multi-module fault	More than 2 rectifiers have alarm	Critical alarm	N/A	
17	System maintenance time out	It has exceeded the set maintenance time of the system	Observation alarm	N/A	
18	Module communication interrupted	The rectifier fails to communicate with the monitoring unit	Critical alarm	3	
19	Module AC power cut	All the AC voltages are lower than the under-voltage threshold	Critical alarm	3	
20	Module over-temperature	The internal temperature of the module is too high, higher than 90℃	Observation alarm	N/A	
21	Module fault	The rectifier voltage is too high, higher than upper limit of the rectifier voltage	Critical alarm	3	
22	Module protection	AC over-voltage (295V) or under-voltage (80V)	Observation alarm	3	
23	Module fan fault	The fan has fault, and the temperature of the rectifier air inlet is high	Critical alarm	3	
24	Module limited power	The AC voltage is low, and the internal temperature or air inlet temperature of the rectifier is high	Observation alarm	3	

No.	Alarm name	Alarm description	Default alarm level	Default associated relay	Associated setting parameters
25	DC under-voltage	The DC output voltage of the system is lower than the set value of the 'under-voltage alarm' parameter	Critical alarm	2	Under-voltage alarm
26	Low DC voltage	The DC output voltage of the system is lower than the set value of the 'low voltage alarm' parameter	Critical alarm	2	Low voltage alarm
27	DC over-voltage	The DC output voltage of the system is higher than the set value of the 'over-voltage alarm' parameter	Critical alarm	2	Over voltage alarm
28	AC phase loss	The AC input voltage of the power system is lower than 80V	Observation alarm	N/A	
29	AC under-voltage	The AC input voltage of the system is lower than the set value of the 'under-voltage alarm' parameter	Observation alarm	N/A	Under-voltage alarm
30	AC over-voltage	The AC input voltage of the system is higher than the set value of the 'over-voltage alarm' parameter	Observation alarm	N/A	Over voltage alarm
31	Temperature Alarm	The temperature is higher than the set value of the 'over-temperature alarm' parameter The temperature is lower than the set value of the 'low temperature alarm' parameter	Observation alarm	N/A	Over-temperature alarm threshold Low temperature alarm threshold
32	Battery over-temperature alarm	The battery temperature is higher than the set value of the ' high temperature alarm' parameter The temperature sensor has not been connected or has fault	Critical alarm	N/A	High temperature alarm threshold
33	Lightning protector fault	The lightning protection circuit has fault	Critical alarm	8	Existing in the system with AC collection board
34	AC input circuit breaker disconnected	The AC input circuit breaker of the system is disconnected	Critical alarm	N/A	
35	Other equipment fault	Including the DC/DC module fault	Critical alarm	N/A	
36	Digital 1 alarm	The alarm name is defined by the user. The name shall have no more than 10 characters. 'Digital1'~' Digital8' can be changed according to the need. The high level or low level alarm can be set in the alarm mode	No alarm	N/A (The self-defined digital 1 is associated with the relay of digital 8)	In the system without AC collection board, the names of the 8 ways can be self-defined.

The alarm type setting parameters are described as follows:

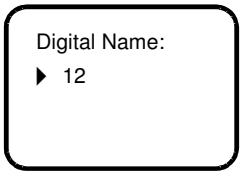
Table 6-6 Description of alarm type parameters

Parameter	Setting range	Default value	Value description
Alarm type	Names of 56 types of alarm events	Different alarm types have different levels and different associated relays	Select the alarm events whose levels and associated relays need to be reconfigured
Level	Critical alarm, major alarm, observation alarm, no alarm		The monitoring module provides different audio/video alarms and alarm Callbacks for alarm events of different alarm levels
Associated relay	Null, No.1~No.8		When the value is 'null', it indicates that there is corresponding dry contact output alarm information when the alarm event occurs. When the value is '1~8', it indicates that there is output alarm information of the dry contact No.1~8 when the alarm event occurs

Description of alarm mode parameter function and value

Different alarm modes can be set for the 8-way digital input alarm. In the system without communication, the alarm name can be modified according to the needs of the user. After the name is changed, the alarm named consulted from the active alarm or alarm history is the name after the change.

When the user changes the alarm name, he/she can select the relevant value to 'set digital name'. After pressing the ENT key for confirmation, the monitoring module will pop up the following digital name input screen.



The setting method is as follows: use ▲ or ▼ to modify the digit or character and ◄ or ► to shift left or right. After the modification, press ENT key to confirm. If '#' or space is entered in the alarm name, in default, the name ends with the '#' or space.

Table 6-7 Settings of alarm mode parameter

Parameter	Setting range	Default value	Value description	
DI No.	No.1~8	1	The numbers refer to the 8 terminals, which are sequenced following the hardware switch numbers	Only functions to the self-defined digital alarm
Alarm mode	High, low	Low	The value 'high' means the high level alarm. The value 'low' means the low level alarm. It shall be set according to the actual power system configuration	
Set digital name	1 to 8	1	The no. of the connecting terminal for inputting the power system digital	
DI Name	Figures or letters, 10 at most	SPD	When there are DI alarms, this parameter shows the alarm name you have actually defined. In the system with an AC sampling board, you can define by yourself the DIs of routes No.7 and No.8. In the system without an AC sampling board, you can define all DIs	
DI No.	No. 1 ~ 8	2	The 8 corresponding connecting terminals, queued up in the order that the hardware switches are put	
Alarm Mode	High, Low	High	'High': alarm upon high level; 'Low': alarm upon low level. Set according to the actual situation	
Set DI Name	1# ~ 8#	2#	Serial No. of the connecting terminal for DI input	
DI Name	Figures or letters, 10 at most	BCU	When there are DI alarms, this parameter shows the alarm name you have actually defined. In the system with an AC sampling board, you can define by yourself the DIs of routes No.7 and No.8. In the system without an AC sampling board, you can define all DIs	

Description of alarm control parameter function and value

'Alarm beeping duration' means the alarm beeping time to be set by the user. That is to say, after new alarm occurs, the module will generate alarm beeping. The beeping time can be set according to the actual need.

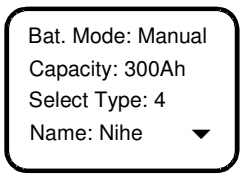
Table 6-8 Description of alarm control parameter

Parameter	Setting range	Default value	Value description
Alarm beeping duration	Normally on, off, 3 minutes, 10 minutes, 1 hour, 4 hours	Normally on	Launch alarm beeping duration control
Clear alarm history	Yes, No	No	When the value 'yes' is selected, clear the alarm history information
Block active alarm	Yes, No	No	When the value 'Yes' is selected, the active alarm will not be sent to the background (EEM protocol)

6.7.3 Battery Settings

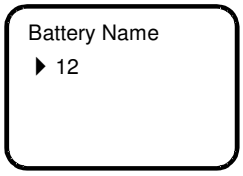
Battery selection

Set the initial screen of the interface as follows:



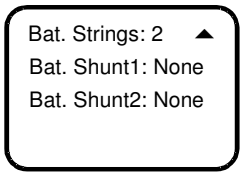
Use ▼ or ▲ to select the page and the parameter to be set, and ◄ or ► to select the proper value for the parameter. Press ENT to confirm and save.

After setting the 'Battery Type', the following prompt will appear, asking you to name a certain type of battery for the sake of identifying them:

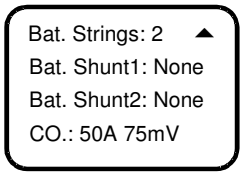


To name a battery, use ▲ or ▼ to modify the number and ◄ or ► to move the direction. Upon modification, press ENT key to confirm.

If it is not required to set the battery diverter coefficient in the 'System Type' parameter selection, the next screen for the battery basic parameter setting is shown as follows:



If it is required to set the battery diverter coefficient in the 'System Type' parameter selection, the next screen for the battery basic parameter setting is shown as follows:



Setting the battery diverter coefficient is to set the diverter model, which consists of two settings and shall be set according to the actual situation.

For instance, if the diverter setting is 500A/75 Mv, it indicates the diverter with a nominal value of 500A outputs 75Mv voltage correspondingly.

The value of battery basic parameters is described in the following table.

Table 6-9 Description of battery basic parameters

Parameter	Setting range	Default value	Value description
Management Mode	Auto, Manual	Auto	Normally, it is in the auto mode. In this case, the monitoring module manages the overall power system in an auto manner, including auto conversion of battery boost charging/float charging, auto power-off of load and auto protection of battery. In the manual mode, it can conduct battery boost charging/float charging test and control the battery re-connection/LVD, and automatically implement two functions, i.e. Protection of the battery boost charging time and capacity calculation. In addition, in case of DC under voltage alarm, it can switch to the automatic management mode so as to prevent system abnormality due to incorrect manual control
Quantity of battery pack	0 to 4	2	The user shall set in accordance with the actual battery configuration. If there is a setting of battery diverter, the number of battery pack cannot be set to '0'
Nominal capacity	50 to 5000Ah	300Ah	It indicates the capacity of single pack of batteries. The user shall set in accordance with the actual battery configuration

Parameter	Setting range	Default value	Value description
Battery type	1 to 11	1	The type of battery has been reserved in the module system. The type of battery under current management can be configure d through the background
Battery name	8-bit character		Name different types of batteries for the convenience of identification
Battery shunt 1	Yes, none	Yes	According to the situation, if there is diverter connected, set to 'Available', or set to 'Unavailable'. The monitoring module only implements management over the battery connected to the diverter
Battery shunt 2		None	
Diverter coefficient	Subject to the system type setting	500A/ 75mV or 300A/ 75mV	If the diverter parameter is set to 'set' in the system type setting, the diverter coefficient setting field will display, or the diverter coefficient is default. Two packs of batteries have same diverter coefficient

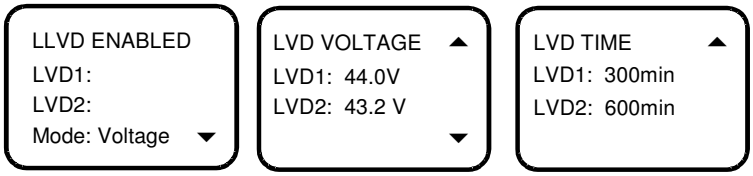
LVD setting

Function description

LVD1: LLVD, which means the monitoring module opens the LLVD contactor, so that the non-priority load will be powered off. In this way, the battery remaining capacity can sustain the priority load longer.

LVD2: BLVD, which means the monitoring module opens the BLVD contactor. In this way, the battery will stop powering the load, preventing over-discharge.

The setting interface is divided into three screens, as shown in the following:



Use ▼ or ▲ to select one page or one of the parameters, and ◄ or ► to select the parameter value. Press ENT to confirm and save.

Note

Normally, the user shall retain the default values of parameters instead of performing additional setting.

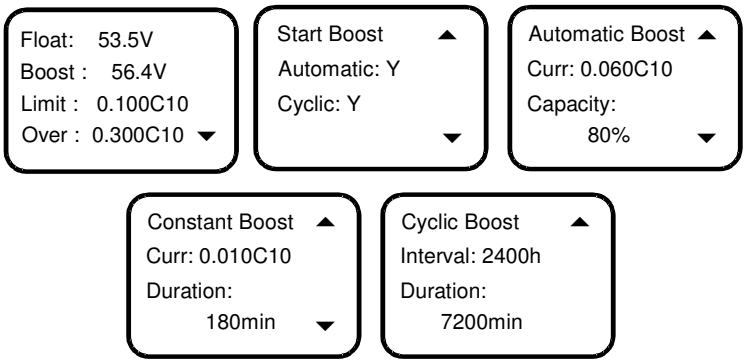
The description of value of the LLVD (load low voltage disconnection) battery protection parameters is shown in the table below.

Table 6-10 Description of LLVD battery protection parameters

Parameter	Setting range	Default value	Value description
LVD1 enabled	Yes, No	Yes	If selecting 'Yes', it indicates the monitoring module has function of automatic load LVD
LVD2 enabled			If selecting 'Yes', it indicates the monitoring module has function of battery protection
LVD mode	Time, voltage	Voltage	If selecting the 'According to voltage', when the monitoring module detects that the battery voltage is lower than the setting value of 'Load LVD voltage', the monitoring module disconnects the load LVD contactor. When the monitoring module detects that the battery voltage is lower than the setting value of 'Battery protection voltage', the monitoring module disconnects the battery protection contactor. If selecting the 'According to time', when the battery discharging time reaches the setting value of 'Load LVD time', the monitoring module disconnects the power-off contactor. When the battery discharging time reaches the setting value of 'Battery protection time', the monitoring module disconnects the battery protection contactor
LVD1 voltage	40V to 60V	44.0V	
LVD2 voltage		43.2V	
LVD1 time	3 to 1,000 minutes	300 minutes	
LVD2 time		600 minutes	

Charge setting

The setting interface is divided into five screens, as shown in the following:



Use ▼ or ▲ to select one page or one of the parameters, and ◄ or ► to select the parameter value. Press ENT to confirm and save.

Note

Normally, the user shall retain the default value of the parameter instead of performing additional setting.

The value of charging management parameters is described in the following table.

Table 6-11 Description of charging management parameters

Parameter	Setting range	Default value	Value description	
Float voltage	42V to 58V	53.5V	In the float charging status, all rectifiers output voltage according to the setting value of 'Float charging voltage'	The setting value of 'Boost charging voltage' must be higher than that of 'Float charging voltage'
Boost voltage		56.4V	In the boost charging status, all rectifiers output voltage according to the setting value of 'Boost charging voltage'	
Current limit	0.1 to $0.25C_{10}$	$0.1C_{10}$	The monitoring module detects the charging current of the battery. If the charging current is higher than the setting value of the 'current limit point', the monitoring module will send current limit control command to limit the charging current of the battery. C_{10} indicates nominal capacity of battery, and is usually set to 10~20% of the capacity of single pack of batteries	
Over current	$0.3C_{10}$ to $1.0C_{10}$	$0.300C_{10}$	The monitoring detects the charging current of the battery. If the charging current is higher than the setting value of the 'over current point', the monitoring module will generate alarm o battery charging over current	
Automatic boost charging enabled	Yes, No	Yes	If selecting 'Enabled', the system meets the boost charging conditions and can be boost charged	
Timing boost charging enabled			If selecting 'Enabled', after the time in which the power system has been in the float charging status reaches that set in the 'Timing boost charging period', the monitoring module will control the power system to conduct timing boost charging. The battery charging voltage is setting value of 'charging voltage' and the charging time is setting value of 'Timing boost charging duration'	
Timing boost charging period	48 to 8760 hours	2400 hours		
Timing boost charging duration	30 to 2880 minutes	720 minutes		
Boost charging conversion current	0.50 to $0.80C_{10}$	$0.06C_{10}$	When the battery capacity reduces to the setting value of 'Boost charging conversion capacity', or when the charging current reaches the setting value of 'Boost charging conversion current', the monitoring module switches the system to the boost charging. The battery charging voltage is the setting value of 'Boost charging voltage'	
Boost charging conversion capacity	0.1 to 0.95	0.80		
CONSTANT boost charging current	0.02 to 0.99C10	$0.01C_{10}$	When the system is in the boost charging status, if the charging current is as low as the setting value of 'Constant boost charging current', the system will automatically transfer to the boost charging after the time set in the 'Constant boost charging time'. The battery charging voltage is the setting value of 'Float charging voltage'	
CONSTANT boost charging time	30 to 1440 minutes	180 minutes		

Parameter	Setting range	Default value	Value description
Boost charging protection time	60 to 2880 minutes	1080 minutes	During the boost charging process, if the boost charging time reaches the setting value of 'Boost charging protection time' or if there are abnormalities (including AC power failure, disconnection of battery branch and rectifier communication), the monitoring module will automatically switch the power system to float charging with force in order to ensure the system security

The conversion of boost charging/float charging is shown the following diagram.

- When the charging current is higher than the boost charging conversion current, it can switch to the float charging in 3 minutes.
- It shall satisfy the timing boost charging condition before performing automatic test, which shall be calculated 2 hours before the test. If there is no boost charging record in 24 hours, the boost charging can be conducted.

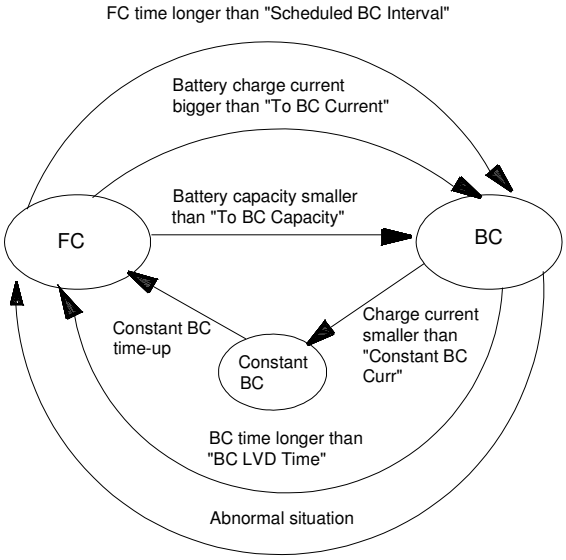
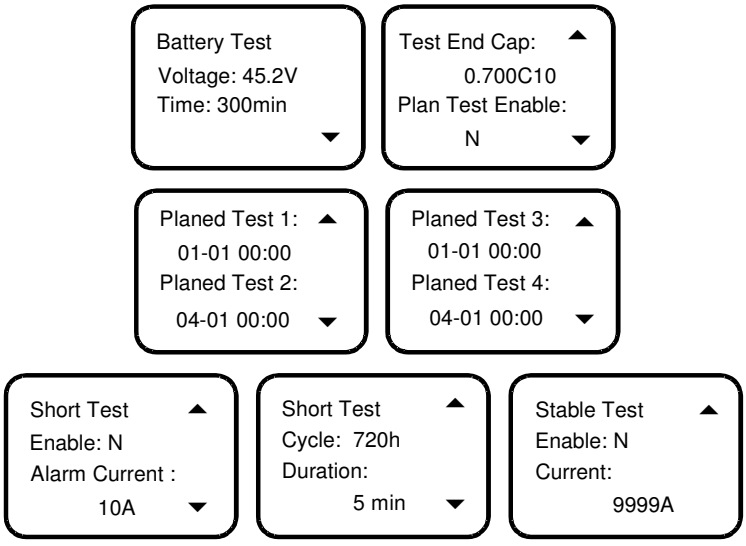

FC time longer than "Scheduled BC Interval"
Battery charge current bigger than "To BC Current"
Battery capacity smaller than "To BC Capacity"
FC
BC
Constant BC time-up
Constant BC
Charge current smaller than "Constant BC Curr"
BC time longer than "BC LVD Time"
Abnormal situation

Figure 6-2 BC and FC illustration

In the diagram, 'FC' stands for 'Float Charging' and 'BC' stands for 'Boost Charging'.

Battery test setting

The setting interface is divided into screens as shown in the following:



When conducting setting, use ▼or ▲ key to select one of screens or parameter items to be set, and ◄ or ► to select the parameter value. Then press ENT key to confirm and save.

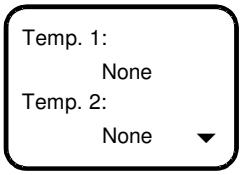
The value of battery test parameters is described in the following table.

Table 6-12 Description of battery test parameters

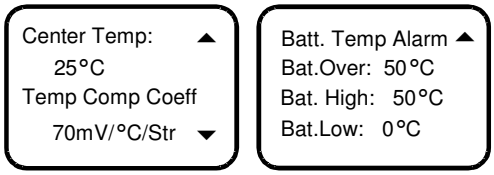
Parameter	Setting range	Default value	Value description
Test end voltage	43.1V to 57.9V	45.2V	The monitoring module can do battery test, and record 10 sets of test data (accessible only through the host). The battery test has to be started manually, then monitoring module will control the rectifier output voltage, make it lower than the battery voltage, and the battery discharge will begin. Monitoring module will stop the test if the battery voltage reaches the 'Battery test voltage', or the discharge time reaches 'Battery test time', or the battery capacity reaches 'Test End Cap'. Afterwards, it will restore the rectifier output voltage to the normal FC voltage, begin the battery charge and switch the system to battery auto-management. Meanwhile the test start time/voltage and end time/voltage and battery remaining capacity will be recorded. The records can be queried through the host. During the battery test, if abnormalities occur, the monitoring module will stop the battery test automatically
Test end time	5 to 1440 minutes	300 minutes	
Test end capacity	$0.01C_{10}$ to $0.95C_{10}$	$0.7C_{10}$	
Timing test enabled	Yes, No	Yes	When the parameter 'Scheduled Test' is set to 'Y', the monitoring module will test the battery according to the 4 sets of test time. You can set at most 12 sets of test time through the host
Timing test time 1	Month, day, hour	24:00 on January 1	
Timing test time 2		24:00 on April 1	
Timing test time 3		24:00 on July 1	
Planed test time 4		24:00 on October 1	
Fast test alarm	1 to 100A	10A	If the battery have not discharged within the 'ShortTest Cycle', the monitoring module will start a short test, whose operation time is set by the parameter 'ShortTest Duration'. By the end of the test, if the difference in the discharge currents of batteries is bigger than the 'Alarm Current', the battery discharge imbalance alarm will be raised. This alarm will automatically end after 5min of delay. Also you can end it by confirming it
Fast test period	24 to 8760 hours	720 hours	
Fast test time	1 to 60 minutes	5 minutes	
Constant current test enabled	Yes, No		The stable test is conducted with constant battery current, whose value is set through the parameter 'StableTest Current'. If the parameter 'StableTest Enable' is set to 'Y', and the test will be started once the battery satisfies the test condition
Constant current test current	0 to 9999A	9999A	

Temperature compensation coefficient setting

The root screen of the setting interface is as follows:



If the 'Temperature1' or 'Temperature2' is set to 'Battery Temp', you need to set the following parameters:



When conducting setting, use ▼ or ▲ key to select one of screens or parameter items to be set, and ◄ or ► to select the parameter value. Then press ENT key to confirm and save.

The value of temperature compensation coefficient is described as follows:

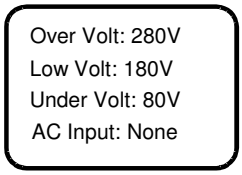
Table 6-13 Description of temperature compensation coefficient

Parameter	Setting range	Default value	Value description
Temperature 1	N/A, battery temperature, ambient temperature	N/A	The 'Ambient Temp' and 'Battery Temp' refer to the measurement of the ambient or battery temperature sensor at the local power system. 'None' means there is no measurement input. You should set this parameter according to the actual situation. The temperature measurement data will be displayed in the system operation information screen
Temperature 2			

Parameter		Setting range	Default value	Value description	
When the value of temperature 1 or temperature 2 is 'Battery temperature'	Temperature compensation point	10℃ to 40℃	25℃	Batteries are sensitive to temperature. To ensure battery's capacity and life, its FC voltage should change together with the temperature: lower FC voltage for higher temperature, and vice versa. <FC = BattTemp – Center Temp % Temp Comp Upon alarms such as 'Rect Com Failure', 'DC Under-volt' and 'DC Voltage High', the monitoring module will not do temperature compensation to the battery FC voltage. Set this parameter according to the actual battery technical parameters	
	Temperature compensation coefficient	0 to 500Mv/℃	72Mv/℃		
When the value of temperature temperature 1 or temperature 2 is 'Battery temperature'	Over temperature protection	10℃ to 100℃	50℃	When the detected battery temperature is higher than the 'Over', the monitoring module will raise an alarm	The 'High' must not be higher than the 'Over'
	High temperature alarm	10℃ to 100℃	50℃	When the detected battery temperature is higher than the 'High', the monitoring module will raise an alarm	
	Low temperature alarm	-40℃ to 10℃	0℃	The monitoring module will raise an alarm when the detected battery temperature is lower than the 'Low'	

6.7.4 AC Settings

The setting interface is shown as follows:



When conducting setting, use ▼ or ▲ key to select one of screens or parameter items to be set, and ◄ or ► to select the parameter value. Then press ENT key to confirm and save.

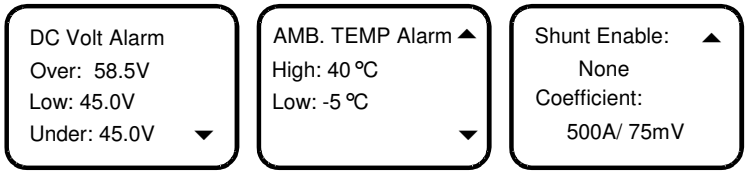
The value of AC parameters is described as follows:

Table 6-14 Description of AC parameters

Parameter	Setting range	Default value	Value description	
Over voltage alarm	50V to 300V	280V	When the system AC input voltage is over the setting value of the 'Over voltage alarm' parameter, the monitoring module will generate an AC over voltage alarm	The setting value of 'Over voltage alarm' must be higher than that of the 'Under voltage alarm'. To prevent miss-alarm or abnormal alarm function, the user should retain the default value
Under-voltage alarm	50V to 300V	180V	When the system AC input voltage is lower than the setting value of the 'Under voltage alarm' parameter, the monitoring module will generate an AC under voltage alarm	
Phase loss alarm	50V to 300V	80V	When the AC voltage of the system work number is lower than the setting value of the 'Phase loss alarm', the monitoring module will generate a phase loss alarm. If the AC voltage of the standby number is low, it will generate an alarm	The setting value of 'Phase loss alarm' must be lower than that of the 'Under voltage alarm'
AC input	3-phase, single phase, N/A	Subject to the system type setting	It will set according to the actual configurations of the power system. In a system with AC collecting board, it can only select '3-phase' and 'single phase'. In a system without AC collecting board, it can only select 'N/A'.	

6.7.5 DC Settings

The setting interface is divided into three screens, as shown in the following:



When conducting setting, use ▼ or ▲ key to select one of screens or parameter items to be set, and ◄ or ► to select the parameter value. Then press ENT key to confirm and save.

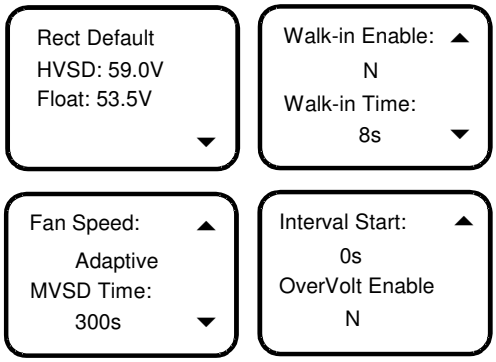
The value of DC parameters is described as follows:

Table 6-15 Description of DC parameters

Parameter	Setting range	Default value	Value description	
Over (over-voltage)	40V to 60V	58.5V	The 'DC Over Voltage' alarm will be raised when the system DC output voltage is higher than the value of 'Over'	The values of these three parameters should be: Over > Low > Under
Low (low-voltage)		45.0V	The DC low voltage alarm will be raised when the system DC output voltage is lower than the value of 'Low'	
Under (under-voltage)		45.0V	The DC under voltage alarm will be raised when the system DC output voltage is lower than the value of 'Under'	
High (high temperature)	-40℃ to 100℃	40℃	The high temperature alarm will be raised when the detected ambient temperature is higher than the value of 'High'	The value of parameter 'High' must be higher than that of parameter 'Low'
Low (low temperature)	-40℃ to 100℃	-5℃	The low temperature alarm will be raised when the detected ambient temperature is lower than the value of 'Low'	
Shunt enable	Available, Unavailable	N/A	Set according to the actual system configuration	
Coefficient	Subject to the system type setting		In a system with load diverter, it can be set only when the diverter option is 'set' in the system type	

6.7.6 Rectifier Settings

The setting interface is divided into four screens, as shown below:



Use ▼ or ▲ to select one page or one of the parameters, and ◄ or ► to select the parameter value. Press ENT to confirm and save.

The value of module parameter is described as follows:

Table 6-16 Description of module parameters

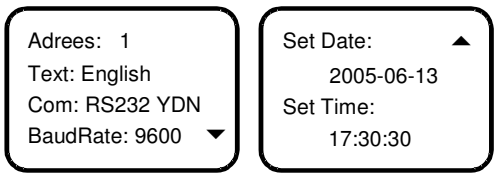
Parameter	Setting range	Default value	Value description	
Module over voltage	56V to 59V	59V	When the module output voltage is higher than the setting value of the 'Module over voltage' parameter, the rectifier will generate a module over voltage alarm	The setting value of the 'Default voltage' must be lower than that of the 'Module over voltage'
Default voltage	48V to 58V	53.5V		

Parameter	Setting range	Default value	Value description
Output soft start enabled	Yes, No	No	Load soft start function means that the rectifier voltage increases gradually from 0V to the setting value of the 'Default voltage' after the setting value of the 'Output soft start time'
Output soft start time	8s to 128s	8s	
Fan speed	Full speed, speed regulation	Speed regulation	If setting to the 'Speed regulation' status, the rectifier will regulate the running speed of the rectifier fan according to the air inlet temperature. If setting to the 'Full speed' status, the fan will run at full speed
Over voltage restart time	50s to 300s	300s	When the rectifier is over voltage, the rectifier will automatically power off. Power on the rectifier after a delay of setting time, and judge whether it is still over voltage. This delay refers to the setting value of the 'Over voltage restart time'. If the rectifier is not over voltage in the 'Over voltage restart time', it is considered that the rectifier can work normally. If the rectifier is over voltage within that time, the rectifier will power off and be locked and cannot power on automatically
Interval start	0 to 10s	0s	The rectifier will output the voltage in a specific sequence and interval. If it is set to '0', it indicates the voltage is output simultaneously
OverVolt Enable	Yes, No	No	If setting to 'Yes', it indicates that the rectifier will still power on forcibly and output the voltage even if it detects there is AC over voltage

6.7.7 System Settings

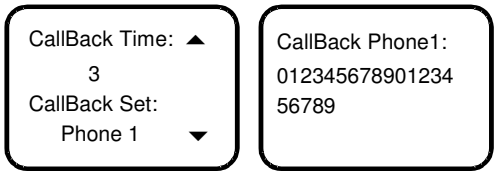
Users with different password levels will have different system parameter settings.

1. For the user level password (by default: 1), the setting interface is divided into two screens, as shown in the following diagram.



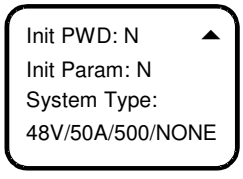
When conducting setting, use ▼ or ▲ key to select one of screens or parameter items to be set, and ◄ or ► to select the parameter value. Then press ENT key to confirm and save.

When the communication mode is 'MODEM', it needs to set Callback number and Callback times.

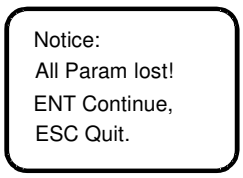


To modify a Callback number, use ▲ or ▼ to modify the number and ◄ or ► to move the direction. Upon modification, press ENT key to confirm.

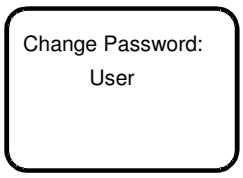
2. For the engineer level password (by default: 2) or administrator level password (the default is '640275'), use ▼ or ▲ to select the following setting screen besides above all screens.



If resetting the system, there will be an information prompt screen:



3. For the administrator level password (the default is '640275'), use ▼ or ▲ to select the following setting screen in addition to the above screens.



After selecting a value in the 'Modify Password' and pressing the ENT key, the password may be modified.

To name a password, use ▲ or ▼ to modify the number and ◄ or ► to move the direction. Upon modification, press ENT key to confirm. During the setting process, it must input the same numbers twice.

4. Password setting and use rules

1) Password can be set to 0 to 6 digits. 0 digit indicates there is no password. When modifying the password, set the first digit of the password to '#' or null, indicating there is no password.

2) The password can be set to numbers and capital letters and lowercase. The capital letters and lowercase are different.

3) After inputting the correct password, stop operating the keypads and the password will remain valid for 4 minutes. In other words, if the user inputs the correct password and operates the keypad constantly, the password will be valid. If no operation is performed to the keypad, the password will be invalid after 4 minutes.

4) If the user level password is identical with the administrator level password, the monitoring module will consider the administrator level password as the default password authority by default. That is to say, if it is set to 'null' by the administrator, all users can access with the administrator level.

Note

If the administrator password is set to 'null', all operations to the monitoring module will be open. Only is the maintenance personnel allowed to perform setting, otherwise incorrect setting may cause system abnormality.

It is better to use the 6-digit password recommended.

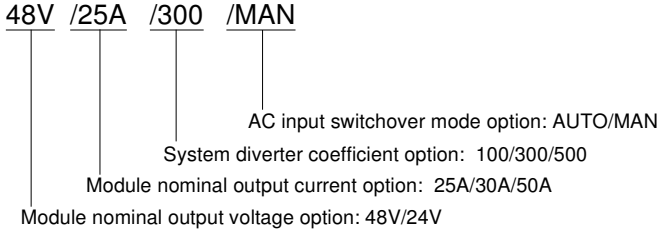
5. The value of system parameter is described in the table below.

Table 6-17 Description of system parameters

Parameter	Setting range	Default value	Value description
Text	English, Spanish, Portuguese, German, Italian, French	English	Set according to customer need
Local address	1 to 254	1	The addresses of power systems that are at the same monitored office should be different

Parameter		Setting range	Default value	Value description
Communication Mode		RS232 YDN,MODEM YDN , MODEM EEM, MODEM EEM R, RS232 EEM ,RS232 EEM R, MODEM SOC, MODEM SOC R, RS232 SOC, RS232 SOC R, MODEM S-T, MODEM S-T R, RS232 S-T, RS232 S-T R	RS232 YDN	The value 'MODEM' indicates communication through the modem under China Telecom protocol, while the value 'RS-232' indicates communicaiton through the transparent serial port under China Telecom protocol. The value 'YDN' refers to China Telcom protocol, 'EEM' refers to communication under the EEM protocol, with no alarm reported. The value 'SOC' refers to communicaiton under the SOC protocol. 'R' indicates reporting alarm. 'S-T' indicates that TPE acts as the communication protocol
Baud rate (bps)		1200, 2400, 4800, 9600	9600	Ensure that the baud rates of the sending party and the receiving party are consistent
When the communication mode is selected as 'MODEM'	Call- back times	1 to 10	3	Set as required. If the MODEM is in the extension status, it needs to add ',' between the dialed number and number requried for Callbacking to form a delay. If the Callbacking number has no 19 digits, end with '#'
	Call- back number	19 digits maximally		
Setting date		Between year 2000 and year 2099		Set the time according to the current actual time, regardless of whether it is a leap year or not
Setting time		Hour, minute, second		
Users with engineer level or above password	Reset the password	Y, N	N	If selecting 'Yes', reset the password. Upon completion, it will recover to 'No'. If operating with the engineer level password, theuser level password and the engineer level password can be recovered to the default password. If the administrator level password is used to conduct resetting operation, all passwords shall be recovered to the default ones
	System reset	N, Y	N	If the system cannot set normally and cannot restore by power off and reset, it can set the 'Init system' to 'Y' and restore setting values of all parameters to the default ones, and then the monitoring module will restart. But alarm may be generated if it is inconsistent with the actual situation. Therefore, it needs to reset the parameters after restoring the default parameters
	System type	NetSure 501 A50: 48V/30A/SET/NONE; NetSure 701 A51 (PS48300-3A/3200): 48V/50A/300/ NONE; NetSure 701 A51 (PS48300-3A/3200-X2): 48V/50A/SET/NONE; NetSure 501 AA0: 48V/30A/300/NONE	This parameter has been set according to the actual situation upon delivery and needs not to be changed. However, when a new monitoring module is used, its 'System Type' should be set according to the actual situation.After this parameter is changed, the monitoring module will restart automatically, and other parameters of the monitoring module will be changed to the defaults of the corresponding system type. You should change some parameters according to the actual situation	
Users with administrator level password	Modify the password	User level, engineer level, administrator level	The password has 0 ~ 6 digits, with '#' or space being the end flag	

6. The format of system type is defined as follows:


48V /25A /300 /MAN
AC input switchover mode option: AUTO/MAN
System diverter coefficient option: 100/300/500
Module nominal output current option: 25A/30A/50A
Module nominal output voltage option: 48V/24V

Note

If the system type is set incorrectly, it may result in inaccurate test of parameter value or invisible failures.

Chapter 7 Alarm Handling

This chapter describes the handling of alarms, as well as the preventive maintenance of the system during system daily operation.

The maintenance personnel must have adequate knowledge about the power system.

Note

The maintenance must be conducted under the guidance of related safety regulations.

Only the trained personnel with adequate knowledge about the power system can maintain the inner part of the subrack.

7.1 Handling Alarms

The monitoring module alarms are classified in four types: critical alarm, major alarm, observation and no alarm.

Critical alarm, major alarm: these two types of alarms have strong impacts on the system performance. Whenever these alarms are generated, users are supposed to handle them immediately. The alarm indicators will be on and audible indication will be given.

Observation: when this type of alarm is raised, the system maintains normal output for a while. If the alarm occurs during watch time, it should be handled immediately. If the alarm occurs during non- watch- time, handle it during watch time. The alarm indicators will be on when observation alarm occurs.

No alarm: if alarms are set as 'no alarm' by the users, when these alarms occur, no visible or audible indication will be generated and the system works normally.

The handling methods of normal alarms are given in Table 6-1.

Table 7-1 System setting parameter description

No.	Alarm	Handling method
1	Mains Failure	If the failure does not last long, the battery will power the load. If the cause is unknown or the failure lasts too long, a diesel generator is needed. Before using the generator's power, it is suggested to run the generator 5 minutes to stabilize the power output
2	AC Voltage High	Check if the AC Over-voltage point is too low. Reset the value if too low A mild over-voltage does not affect the system operation. However, the rectifier will stop operation when the mains voltage is more than 305V. Therefore, if the power supply is constantly over-voltage, the mains power network should be improved
3	AC Voltage Low	Check if the AC Uder- voltage point is too high. Reset the value if too high When the mains voltage is lower than 176V, the output power of the rectifiers will be derated. If the power supply is constantly under-voltage, the main power network should be improved
4	DC Volt High	Check the system DC output voltage and value of "Over" set through the monitoring module. If the set value is improper, correct it. Find out the rectifier that has caused the alarm. First of all, ensure that the batteries can operate normally. Then switch off the AC input of all rectifiers. Power on the rectifiers one by one. If the over-voltage protection is triggered when a certain rectifier is powered on, that rectifier is the faulty one. Replace the fault recitfier
5	DC Volt Low	1. Check the system DC output voltage and value of "Under" set through the monitoring module. If the set value is improper, correct it 2. If the alarm is caused by mains failure,check if certain loads can be disconnected to prolong the operation of the whole system 3. If the alarm is due to rectifier fault, find out the faulty rectifier and replace it 4. Compare the total load current with the rectifier current, and the former should not be bigger than the later at FC voltage, otherwise partial loads must be disconnected to ensure the safe operation of the whole system. Add several rectifiers to make the total rectifier current bigger than 120% of the total load current. In addition, there must be at least 1 rectifier for redundancy standby
6	Load Fuse Alarm/ Batt Fuse Alarm	Check if the MCB of the route is switched off.If the MCB is open, find out the fault and remove it. Otherwise, the alarm loop is faulty. Please contact Emerson

No.	Alarm	Handling method
7	LVD2	1. Check if there is mains failure, or the battery voltage is lower than the “BLVD” value, or the battery discharge time is more than the “BLVD Time” 2. The battery is disconnected from the system manually
8	Rect Failure	The red LED on the rectifier will turn on 1. Reset the rectifier by powering it off and then on again 2. If the rectifier still causes this alarm, replace it
9	Rect Protect	Check if the mains is outside the range of 80V ~ 295V (between the AC under-voltage point and over-voltage point) If the power supply is constantly over/under-voltage, the mains power network should be improved
10	Rect Fan Fails	1. Check whether the rectifier fan is still working. 2. If the fan stands still, pull out the rectifier to check whether the fan is blocked or not. If yes, clean it and push the rectifier back. However, if the fan still does not move after the rectifier is powered on, replace it (see Replacing rectifier fan in *6.2 Handling Rectifier Fault*)
11	Rect Not Respond	Check if the communication between rectifier and monitoring module fails. If the communication is normal, reset the rectifier by pulling it out and pushing back in. If the alarm persists, replace the rectifier
12	Batt Over Temp	1. Check if there is battery internal fault. If yes, replace the fault battery 2. Check if the battery room temperature too high. If yes, cool down the battery room

7.2 Handling Rectifier Fault

The indicator description and handling methods of R48-1800 rectifier, R48-2900U rectifier and R48-3200 rectifier are the same.

Handling indicator fault

The symptoms of usual rectifier faults include: Run indicator (green) off, Protection indicator (yellow) on, Protection indicator blink, Fault indicator (red) on and Fault indicator blink, as shown in Figure 6-1.

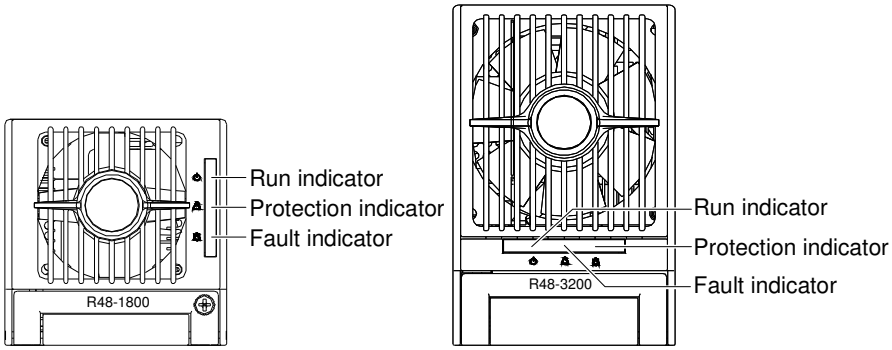


Figure 7-1 Rectifier indicator

The indicators are shown in Figure 6-2.

Table 7-2 Indicator fault description

Symptom	Monitoring module alarms	Causes	Handling method
Run indicator off	No alarm	No input/output voltage	Make sure there is input/output voltage
		Assistant power source of the rectifier fails	Replace the recitifier
Run indicator blinks	No alarm	The monitoing module performs operations upon the rectifier	No actions need to be taken
Protection indicator on	Rect Protect	AC input voltage abnormal	Make sure the AC input voltage is normal
	Rect Protect	Fan blocked	Remove the object that blocks the fan
		Ventilation path blocked at the inlet or vent	Remove the object at the inlet or vent
		Ambient temperature too high or the inlet too close to a heat source	Decrease the ambient temperature or remove the heat source
	Load share Alarm	Current sharing imbalance	Check whether the rectifier communication is normal. If not, check whether the communication cable is in normal connection. If the communication is normal while the protection indicator is on, replace the rectifier

Symptom	Monitoring module alarms	Causes	Handling method
	Rect Protect	Power factor compensation internal under voltage or over voltage	Replace the rectifier
Protection indicator blinks	Rect Not Respond	Rectifier communication interrupted	Check whether the communication cable is in normal connection
Fault indictor on	Rect HVSD	Rectifier over-voltage	Reset the rectifier. If the protection is triggered again, replace the rectifier
	Rect Failure	Two or more recitifiers have the same ID number	Contact Emerson for maintenance
	Rect Failure	Serious current sharing imbalance (R48-1800: load current imbalance > ± 3%; R48-3200/ R48-2900U: load current imbalance > ± 5%)	Check whether the rectifier communication is normal. If not, check whether the communication cable is in normal connection. If the communication is normal while the protection indicator is on, replace the rectifier
Fault indicator blinks	Rect Fan Fails	Fan fault	Replace the fan

Replacing rectifier fan

If the rectifier fan is faulty and does not work, it should be replaced. Take the R48-1800 rectifiers as an example, the replacement procedures are as follows:

1. Use a cross screwdriver to remove the 3 screws from the fixing holes and pull out the front panel, as shown in Figure 6-2.

2. Unplug the power cable of the fan and remove the fan.

3. Install a new fan.

4. Plug the fan power cable.

5. Put the front panel back and fasten it with the 3 screws.

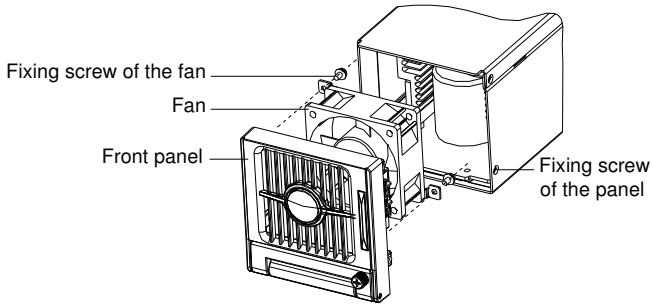


Figure 7-2 Disassembling the front panel

Replacing rectifier

Except replacing the fan, it is recommended not to repair any other part of the module. When faulty, the module should be replaced, not repaired. See the following procedures to replace the rectifier.

1. Take a new rectifier and check it for any damage from transport.

2. Loosen the fixing screw of the handle of the R48-1800 rectifier with a Phillips screwdriver. Pull out the faulty rectifier from the rack by grabbing its handle.

Be careful with the rectifier just pulled out from the system, as it could be very hot due to long-term operation. Do not let it slip away and get damaged.

3. By holding the rectifier handle, push the new rectifier into the slot just vacated and make sure the connection is good. After a brief delay, the rectifier run indicator will turn on and the fan will start running.

4. Check whether the new rectifier works normally. You should make sure that:

1) The monitoring module recognizes the new rectifier.

2) The new rectifier shares current with other rectifiers.

3) When this new rectifier is pulled out, there is a corresponding alarm and the monitoring module displays the alarm.

If the new rectifier passes all the above tests, the replacement is a success.

5. Push the handle back into the front panel to fix the rectifier with the positioning pin. Fix the fixing screw of the handle of the R48-1800 rectifier with a Phillips screwdriver.

Appendix 1 Technical And Engineering Data

Table 1 Technical data

Parameter category	Parameter	Description
Environmental	Operating temperature	-5℃ ~ 40℃
	Storage temperature	-40℃ ~ 70℃
	Relative humidity	5%RH ~ 95%RH
	Altitude	≤ 2,000m (derating is necessary above 2,000m)
	Others	No conductive dust or erosive gases. No possibility of explosion
AC input	AC input system	NetSure 701 A51 (PS48300-3A/3200-X2): P + N + PE/ 230Vac Others: 3P + N + PE/ 380Vac
	Input voltage range	NetSure 701 A51: 85 ~ 290Vac NetSure 501 A50, NetSure 501 AA0: 85 ~ 300Vac
	Input AC voltage frequency	45Hz ~ 65Hz
	Max input current	NetSure 701 A51 ≤ 103A NetSure 501 A50 ≤ 54A NetSure 501 AA0 ≤ 108A
	Power factor	≥ 0.99
DC output	Rated output DC voltage	-48Vdc
	Output DC voltage	-42.3Vdc ~ -57.6Vdc
	Maximum output current	NetSure 701 A51 ≤ 275A, load current ≤ 200A, battery charge current ≤ 50A NetSure 501 A50 ≤ 150A, load current≤ 120A, battery charge current ≤ 30A NetSure 501 AA0 ≤ 300A, load current≤ 250A, battery charge current ≤ 50A
	Voltage set-point accuracy	≤ 1%
	Efficiency	NetSure 701 A51 ≥ 89% NetSure 501 A50, NetSure 501 AA0 ≥ 90%
	Noise (peak-peak)	≤ 200Mv (0 ~ 20MHz)
	Weighted noise	≤ 2Mv (300 ~ 3400Hz)
AC input alarm and protection	AC input over-voltage alarm point	Default: 280 ± 5Vac, cofigurable through monitoring module
	AC input over-voltage alarm recovery point	Default: 270 ± 5Vac, 10Vac lower than the AC input over-voltage alarm point
	AC input under-voltage alarm point	Default: 180 ± 5Vac, configurable through monitoring module
	AC input under-voltage alarm recovery point	Default: 190 ± 5Vac, 10Vac higher than the AC input under-voltage alarm point
	AC input over-voltage protection point	NetSure 501 A50, NetSure 501 AA0: 305 ± 5Vac by default, cofigurable through monitoring module NetSure 701 A51: 295 ± 5Vac by default, cofigurable through monitoring module
	AC input over-voltage protection recovery point	NetSure 501 A50, NetSure 501 AA0: 295 ± 5Vac by default, 10Vac lower than the AC input over-voltage alarm point NetSure 701 A51: 285 ± 5Vac by default, 10Vac lower than the AC input over-voltage alarm point
	AC input under-voltage protection point	Default: 80 ± 5Vac, configurable through monitoring module
	AC input under-voltage protection recovery point	Default: 95 ± 5Vac, 10Vac higher than the AC input under-voltage alarm point
DC output alarm and protection	DC output over-voltage alarm point	Default: 58.0 ± 0.2Vdc, configurable through monitoring module
	DC output over-voltage recovery point	Default: 57.5 ± 0.2Vdc, 0.5Vdc lower than the over-voltage alarm point
	DC output under-voltage alarm point	Default: 45.0 ± 0.2Vdc, configurable through monitoring module
	DC output under-voltage recovery point	Default: 45.5 ± 0.2Vdc, 0.5Vdc higher than the under-voltage alarm point
	DC output over-voltage proteciton point	Default: 59.0 ± 0.2Vdc, configurable through monitoring module
	LLVD	Default: 44.0 ± 0.2Vdc, configurable through monitoring module

Parameter category	Parameter	Description
	BLVD	Default: 43.2 ± 0.2Vdc, configurable through monitoring module
Rectifier	Current sharing	The rectifiers can work in parallel and share the current. The unbalanceness is better than ± 3% (R48-1800) or ± 5% (R48-3200/ R48-2900U) rated output current. Test current range: 10% ~ 100% rated current
	Derate by input (at 45℃)	R48-1800: The rectifier outputs max. 1700W power with input voltage 176Vac. The rectifier outputs 800W power with input voltage 85Vac R48-3200/ R48-2900U: The rectifier outputs 100% power with input voltage 176Vac. The rectifier outputs 50% power with input voltage 120Vac. The rectifier outputs 18.75% power with input voltage 85Vac
	Over-voltage protection	The rectifier provides over-voltage hardware and software protection. The hardware protection point is 59.5V ± 0.5V, and it requires manual resetting to restore operation. The software protection point is between 56V and 59V (0.5V above output voltage, 59V by default), and can be set through the monitoring module There are two software protection modes, which can be selected through the software at the host: 1. Lock out at the first over-voltage Once the output voltage reaches protection point, the rectifier will shut off and hold that state. It requires manual resetting to restore the operation 2. Lock out at the second over-voltage When the output voltage reaches the software protection point, the rectifier will shutdown, and restart automatically after 5 seconds. If the over-voltage happens again within a set time (default: 5min. Configurable through monitoring module), the rectifier will shut off and hold that state. It requires manual resetting to restore the operation Manual resetting: Resetting can be done manually through the monitoring module, or by removing the rectifier from system
	Output delay	Output voltage can rise slowly upon rectifier start up. The rise time is configurable
	Fan speed adjustable	Rectifier fan speed can be set to half or full speed
	Temperature derating	R48-1800: Temperature below 45℃, outputs full power Temperature above 45℃, there will be linear derating, that is: At 55℃, output power is 1,600W At 65℃, output power is 1,500W At 75℃, output power is 800W At 80℃, output power is 0W R48-3200: Starts at -40℃; Temperature below 45℃, outputs full power Temperature above 45℃, there will be linear derating, that is: At 65℃, output power is 2,320W At 70℃, output power is 1,450W At 75℃, output power is 0W R48-2900U: At the ambient temperature of: Below 45℃, outputs full power: 2,900W Above 45℃, there will be linear derating, that is: At 55℃, output power ≥ 2,320W At 60℃, output power ≥ 1,450W At 65℃, output power: 0W

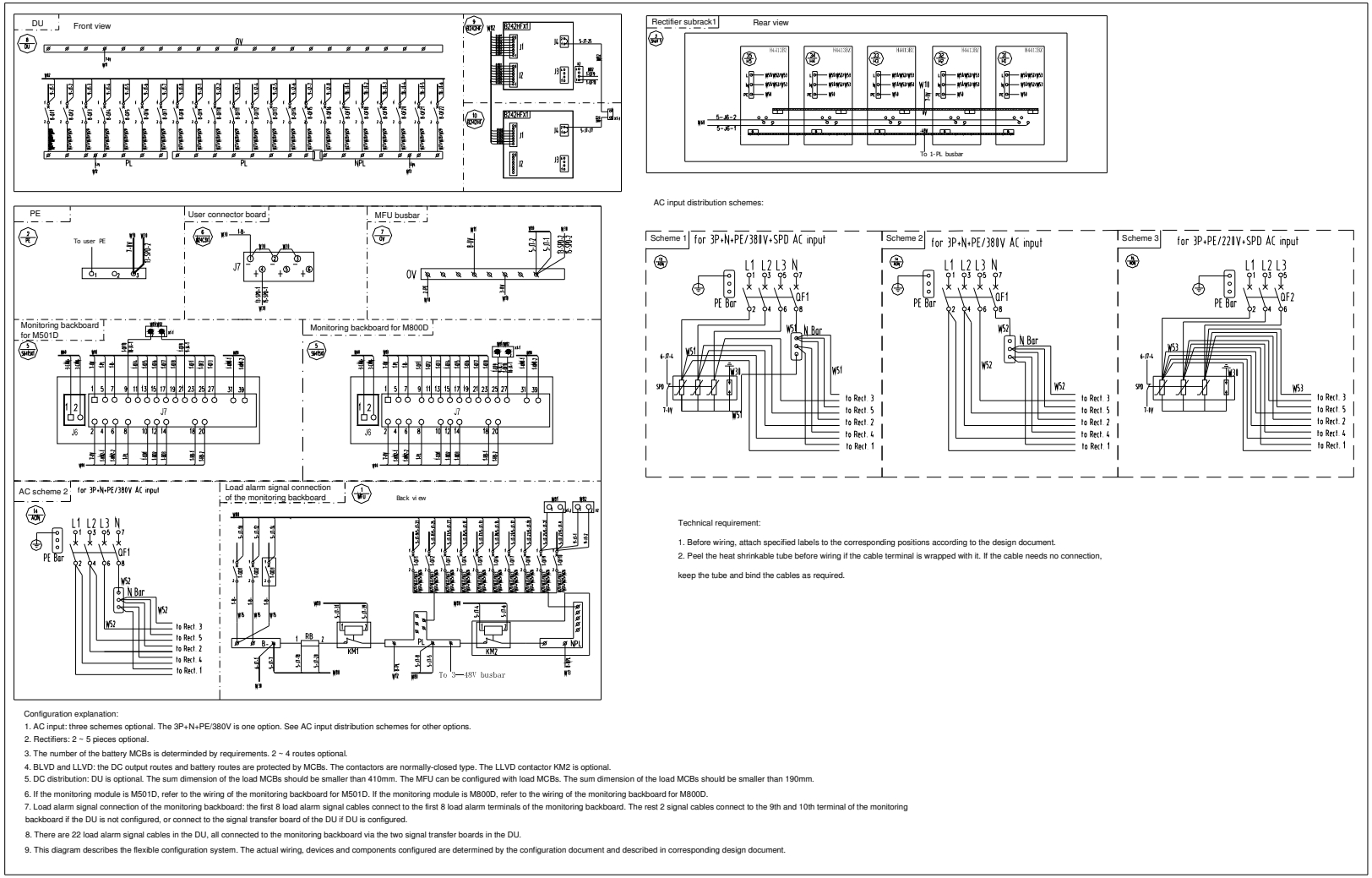
Parameter category	Parameter		Description
EMC	Conducted emission		Class A EN55022
	Radiated emission		
	Voltage fluctuation and flash		EN61000-3-11
	Immunity to EFT		Level 4 EN/IEC 61000-4-4
	Immunity to ESD		Level 3 EN/IEC 61000-4-2
	Immunity to surges		Level 4 EN/IEC 61000-4-5
	Immunity to radiation		Level 2 EN/IEC 61000-4-3
	Immunity to conduction		Level 2 EN/IEC 61000-4-6
Lightning protection features	At AC side		The AC input side can withstand five times of simulated lightning voltage of 5Kv at 10/700μs, for the positive and negative polarities respectively. It can withstand five times of simulated lightning surge current of 20Ka at 8/20μs, for the positive and negative polarities respectively. The test interval is not smaller than 1 minute. It can also withstand one event of simulated lightning surge current of 40Ka at 8/20μs
Others	Safety regulation		IEC60950-1:2001
	Acoustic noise		≤ 55 db (A) (When the ambient temperature is lower than25℃)
	Insulation resistance		At temperature of 15℃ ~ 35℃ and relative humidity not bigger than 90%RH, apply a test voltage of 500Vdc. The insulation resistances between AC circuit and earth, DC circuit and earth, and AC and DC circuits are all not less than 10MΩ
	Insulation strength		(Remove the SPD, monitoring module and rectifiers from the system before the test.) AC circuit to earth: 50Hz, 2,500Vac; or 3535Vdc DC circuit to earth: 50Hz, 1,000Vac; or 1414Vdc Assistant circuit (not directly connected to the host circuit): 50Hz, 500Vac AC to DC circuits: 50Hz, 3,000Vac; or 4242Vdc For all the three tests above, there should be no breakdown or flashover within 1min, with leakage current not bigger than 10Ma
	MTBF		200,000hr
	ROHS		Compliant with R5 requirement
Mechanical	Dimensions (mm)	Maximum dimensions of the subracks	NetSure 501 A50: 483 (W) × 380 (D) × 267 (H) NetSure 501 AA0: 483 (W) × 380 (D) × 490 (H) NetSure 701 A51 (PS48300-3A/3200): 483 (W) × 380 (D) × 445 (H) NetSure 701 A51 (PS48300-3A/3200-X2): 483 (W) × 380 (D) × 311 (H)
		Monitoring module M501D/ M500D	87 (H) × 85 (W) × 287 (D)
		Rectifier	R48-1800: 87.9 (H) × 85.3 (W) × 272 (D) R48-3200/ R48-2900U: 132.5 (H) × 88 (W) × 287 (D)
	Weight (kg)	Subrack (without rectifiers and monitoring module)	NetSure 501 A50, NetSure 701 A51 ≤ 25 NetSure 501 AA0 ≤ 30
		Monitoring module M501D/ M500D	< 0.8
		Rectifier	R48-1800 ≤ 2.0 R48-3200/ R48-2900U: ≤ 3.5

Table 2 Input and output connector specs

Connector		Specs		Remarks
		Capacity	Connector specs	
AC Power distribution	AC input MCB	Configured according to customer requirement	H cable terminals, 2pcs (cable CSA ≤ 35mm^2)	The live line of AC power supply
	Grounding terminal	One M10 bolt	Cable CSA ≤ 35mm^2	Connected to the grounding bar of the room
DC power distribution	Positive busbar	Small terminal: cable CSA ≤ 16mm^2; large terminal: cable CSA ≤ 50mm^2		
	Battery MCB	2 × 125A/ 1P MCB		

Connector		Specs		Remarks
		Capacity	Connector specs	
	Output routes	NetSure 501 A50: BLVD load route, 3 × 63A/1P, 3 × 32A/1P, 4 × 10A/1P MCB NetSure 501 AA0: BLVD load route, 5 × 63A/1P, 5 × 32A/1P, 8 × 10A/1P MCB NetSure 701 A51 (PS48300-3A/3200): BLVD load route, 5 × 63A/1P, 5 × 32A/1P, 8 × 10A/1P MCB NetSure 701 A51 (PS48300-3A/3200-X2): BLVD load route, 4 × 40A/1P, 1 × 10A/1P MCB No LLVD load routes		

Appendix 2 Wiring Diagram



Technical requirement:

1. Before wiring, attach specified labels to the corresponding positions according to the design document.
2. Peel the heat shrinkable tube before wiring if the cable terminal is wrapped with it. If the cable needs no connection, keep the tube and bind the cables as required.

Configuration explanation:

1. AC input: three schemes optional. The 3P+N+PE/380V is one option. See AC input distribution schemes for other options.
2. Rectifiers: 2 ~ 5 pieces optional.
3. The number of the battery MCBs is determinded by requirements. 2 ~ 4 routes optional.
4. BLVD and LLVD: the DC output routes and battery routes are protected by MCBs. The contactors are normally-closed type. The LLVD contactor KM2 is optional.
5. DC distribution: DU is optional. The sum dimension of the load MCBs should be smaller than 410mm. The MFU can be configured with load MCBs. The sum dimension of the load MCBs should be smaller than 190mm.
6. If the monitoring module is M501D, refer to the wiring of the monitoring backboard for M501D. If the monitoring module is M800D, refer to the wiring of the monitoring backboard for M800D.
7. Load alarm signal connection of the monitoring backboard: the first 8 load alarm signal cables connect to the first 8 load alarm terminals of the monitoring backboard. The rest 2 signal cables connect to the 9th and 10th terminal of the monitoring backboard if the DU is not configured, or connect to the signal transfer board of the DU if DU is configured.
8. There are 22 load alarm signal cables in the DU, all connected to the monitoring backboard via the two signal transfer boards in the DU.
9. This diagram describes the flexible configuration system. The actual wiring, devices and components configured are determined by the configuration document and described in corresponding design document.

Figure 1 NetSure 501 A50 wiring diagram

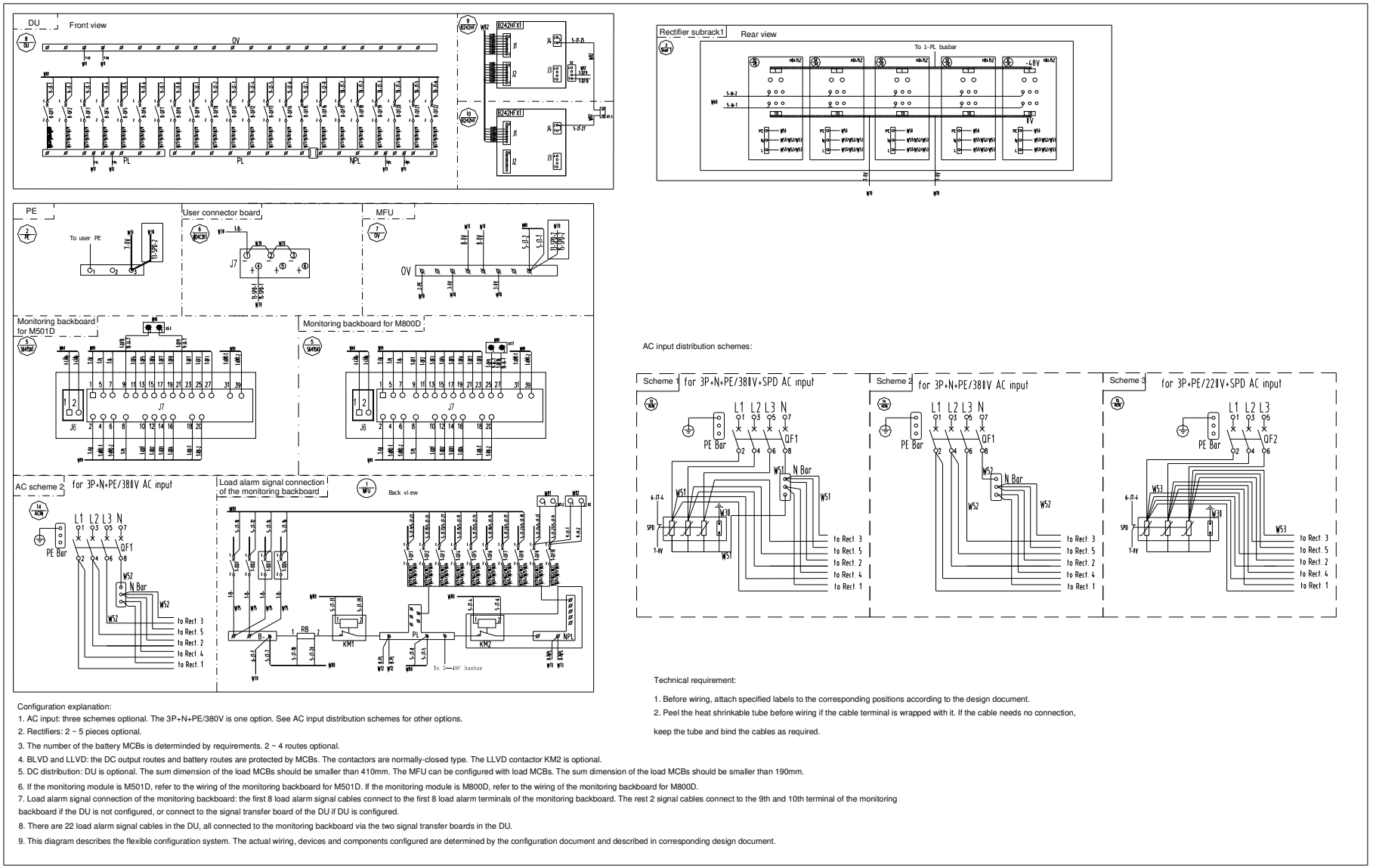
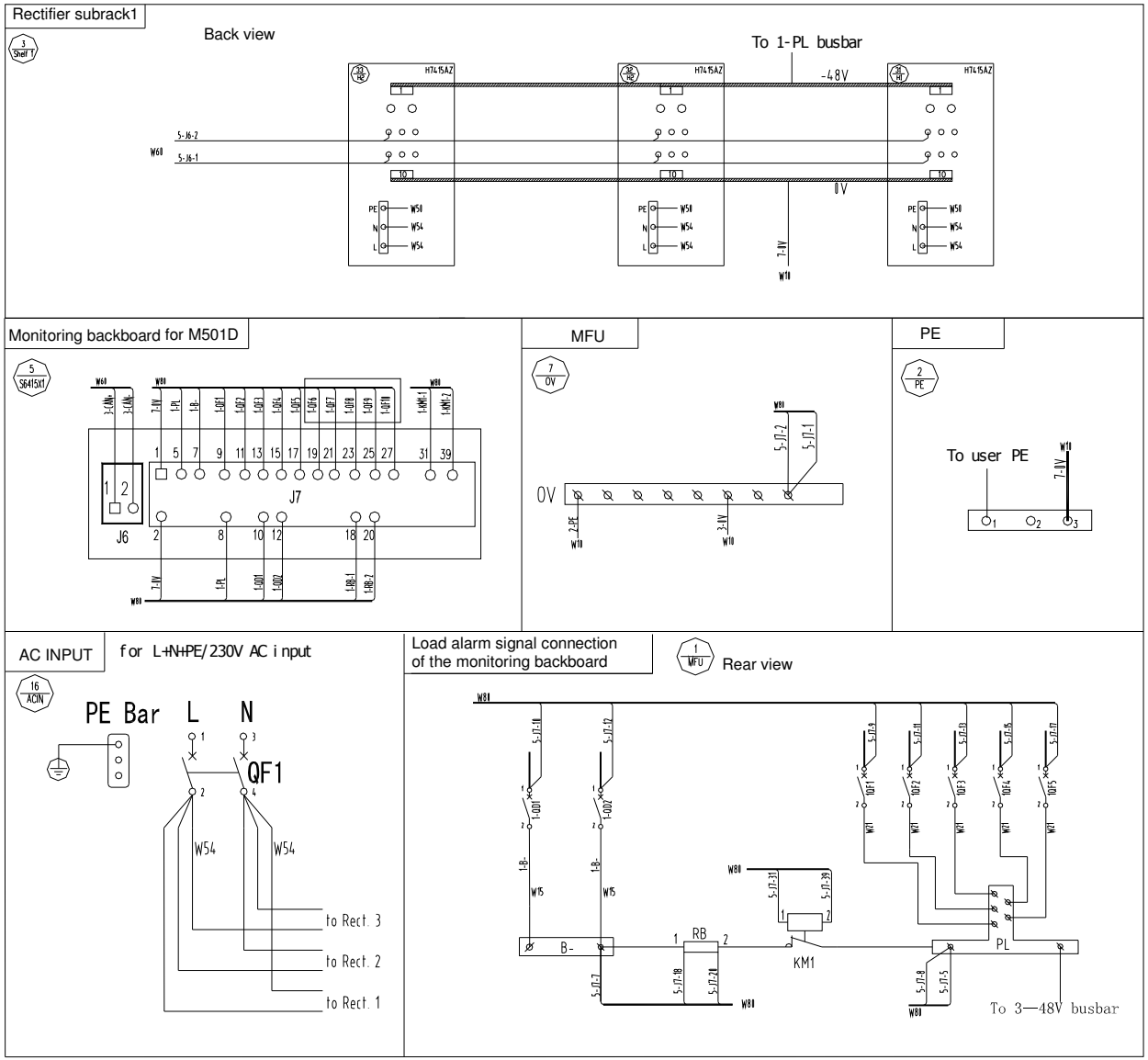

DU
Front view
Rectifier subrack1
Rear view
PE
User connector board
MFU
Monitoring backboard for M501D
Monitoring backboard for M800D
AC scheme 2
for 3P+N+PE/380V AC input
Load alarm signal connection of the monitoring backboard
Back view
AC input distribution schemes:
Scheme 1
for 3P+N+PE/380V+SPD AC input
Scheme 2
for 3P+N+PE/380V AC input
Scheme 3
for 3P+PE/220V+SPD AC input
Configuration explanation:
1. AC input: three schemes optional. The 3P+N+PE/380V is one option. See AC input distribution schemes for other options.
2. Rectifiers: 2 ~ 5 pieces optional.
3. The number of the battery MCBs is determinded by requirements. 2 ~ 4 routes optional.
4. BLVD and LLVD: the DC output routes and battery routes are protected by MCBs. The contactors are normally-closed type. The LLVD contactor KM2 is optional.
5. DC distribution: DU is optional. The sum dimension of the load MCBs should be smaller than 410mm. The MFU can be configured with load MCBs. The sum dimension of the load MCBs should be smaller than 190mm.
6. If the monitoring module is M501D, refer to the wiring of the monitoring backboard for M501D. If the monitoring module is M800D, refer to the wiring of the monitoring backboard for M800D.
7. Load alarm signal connection of the monitoring backboard: the first 8 load alarm signal cables connect to the first 8 load alarm terminals of the monitoring backboard. The rest 2 signal cables connect to the 9th and 10th terminal of the monitoring backboard if the DU is not configured, or connect to the signal transfer board of the DU if DU is configured.
8. There are 22 load alarm signal cables in the DU, all connected to the monitoring backboard via the two signal transfer boards in the DU.
9. This diagram describes the flexible configuration system. The actual wiring, devices and components configured are determined by the configuration document and described in corresponding design document.
Technical requirement:
1. Before wiring, attach specified labels to the corresponding positions according to the design document.
2. Peel the heat shrinkable tube before wiring if the cable terminal is wrapped with it. If the cable needs no connection,
keep the tube and bind the cables as required.

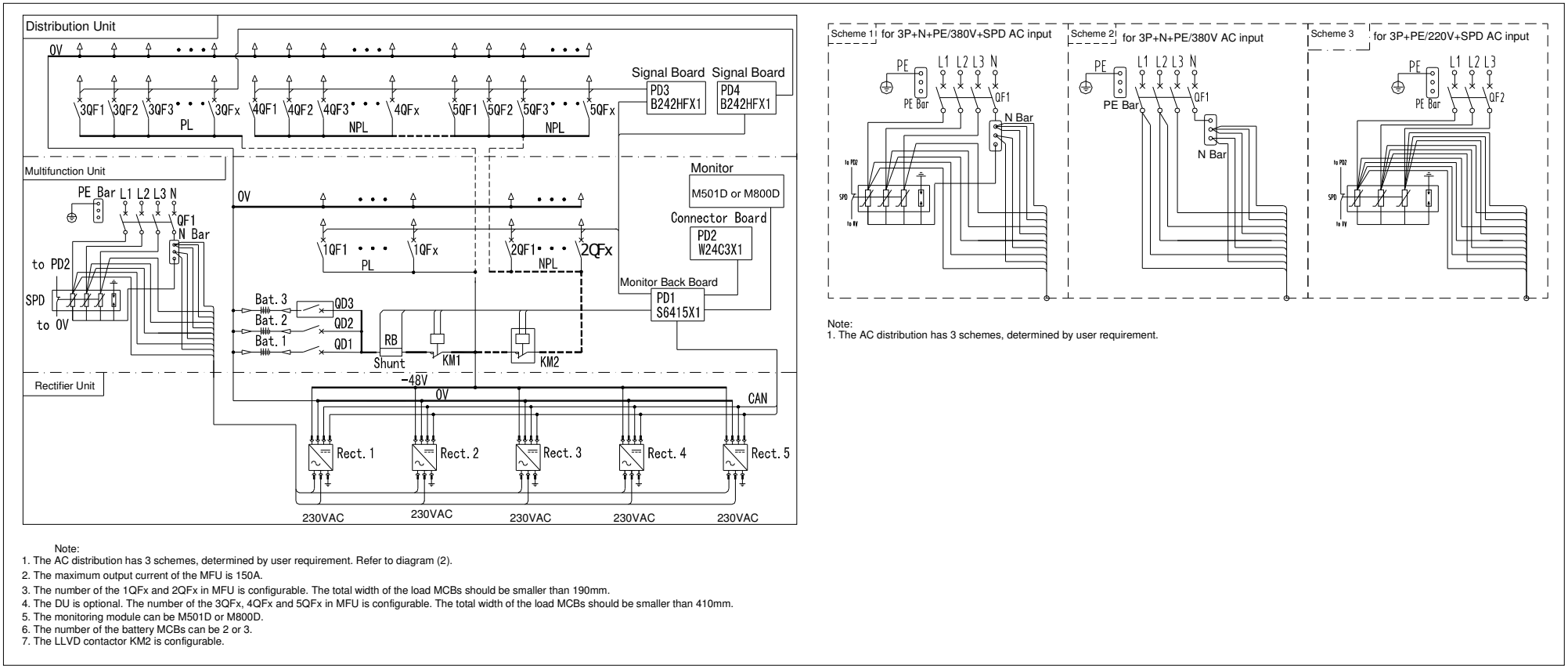
Figure 2 NetSure 701 A51 (PS48300-3A/3200) wiring diagram



Note:
The wiring in the dashed square means the load alarm routes can be expanded to 10.

Figure 3 NetSure 701 A51 (PS48300-3A/3200-X2) wiring diagram

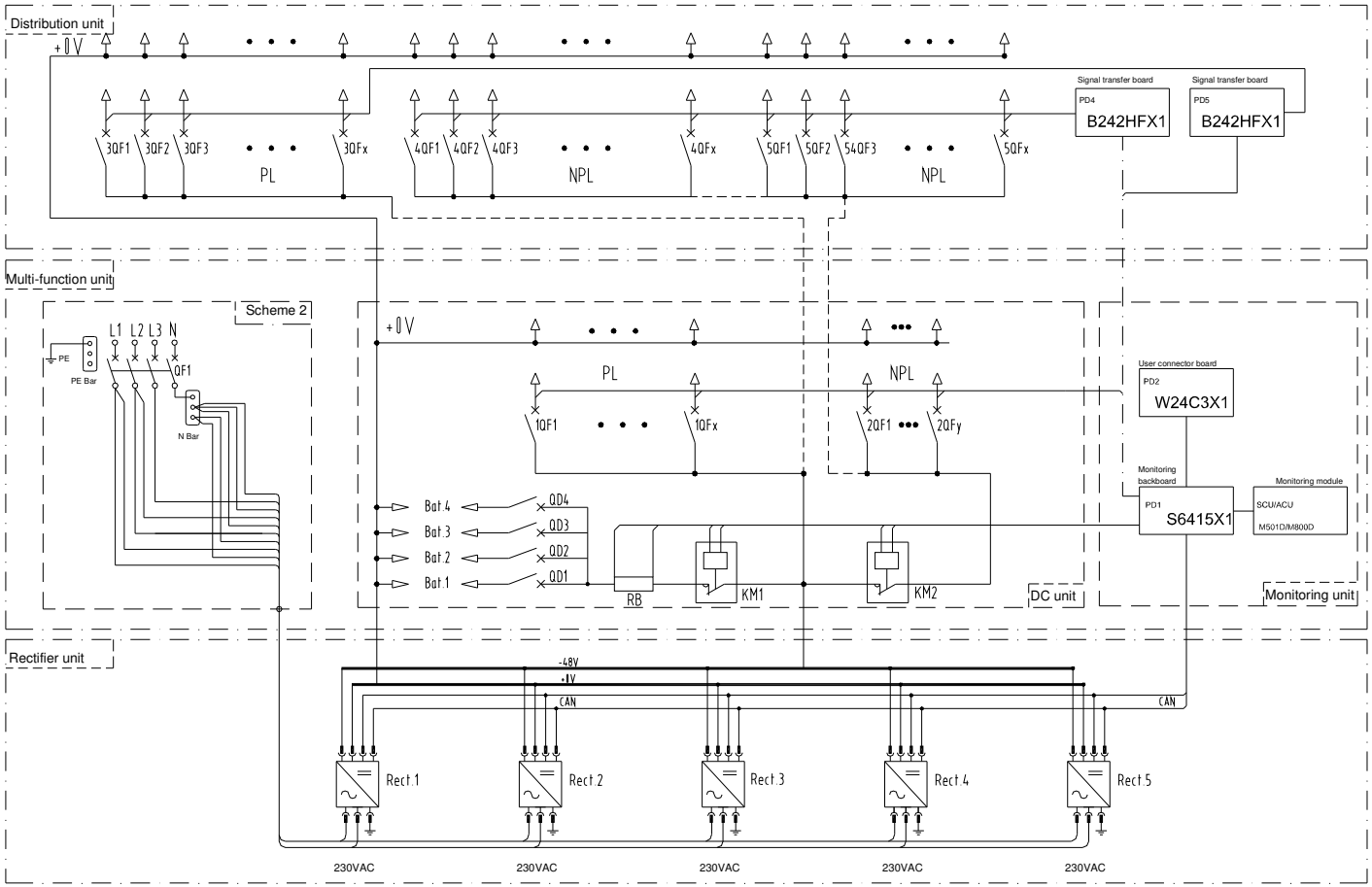
Appendix 3 Schematic Diagram



Note:
1. The AC distribution has 3 schemes, determined by user requirement.

Note:
1. The AC distribution has 3 schemes, determined by user requirement. Refer to diagram (2).
2. The maximum output current of the MFU is 150A.
3. The number of the 1QFx and 2QFx in MFU is configurable. The total width of the load MCBs should be smaller than 190mm.
4. The DU is optional. The number of the 3QFx, 4QFx and 5QFx in MFU is configurable. The total width of the load MCBs should be smaller than 410mm.
5. The monitoring module can be M501D or M800D.
6. The number of the battery MCBs can be 2 or 3.
7. The LLVD contactor KM2 is configurable.

Figure 4 Schematic diagram of NetSure 501 A50



Note:

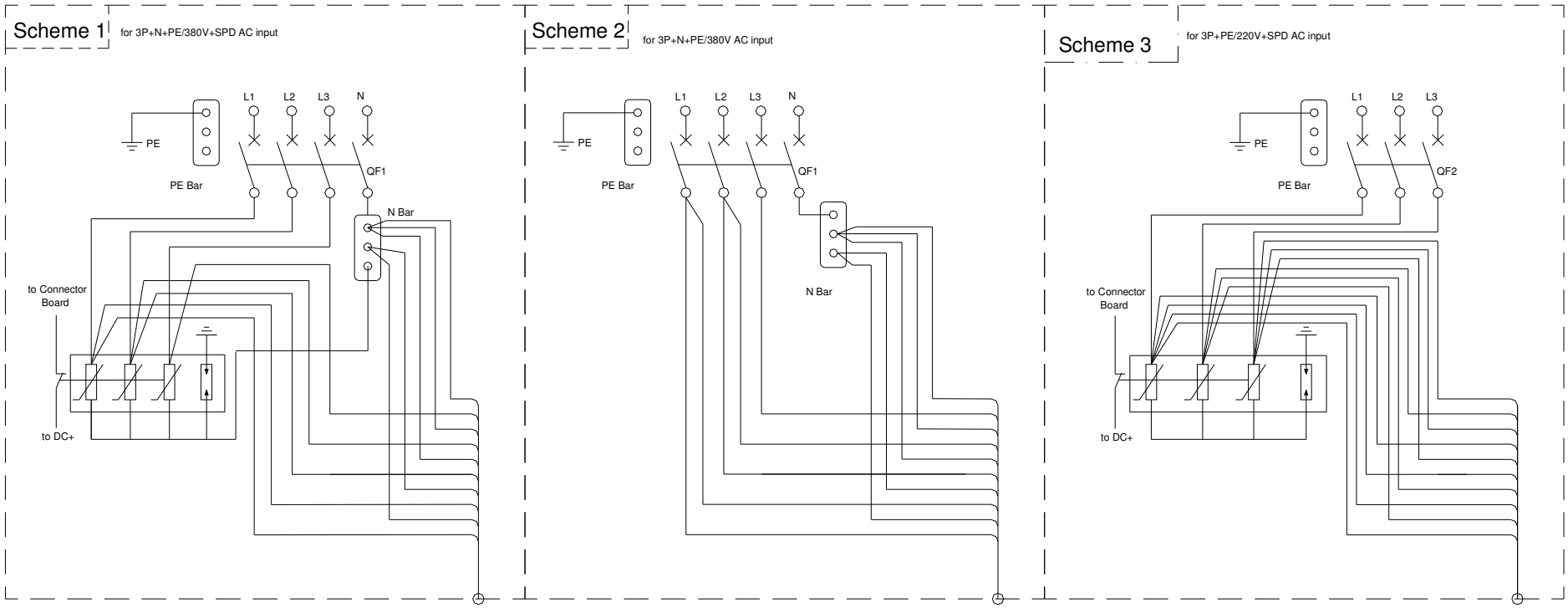
1. The AC distribution has 6 schemes, determined by user requirement. Refer to diagram (2).

2. The maximum output current of the MFU is 300A.

3. The number of the 1QF and 2QF in MFU is configurable. The maximum number is 10.

4. The DU is optional. The number of the 3QF, 4QF and 5QF in MFU is configurable. The maximum number is 22.

Figure 5 Schematic diagram of NetSure 701 A51 (PS48300-3A/3200) (1)



Note:

1. The AC distribution has 6 schemes, determined by user requirement.

Figure 6 Schematic diagram of NetSure 701 A51 (PS48300-3A/3200) (2)

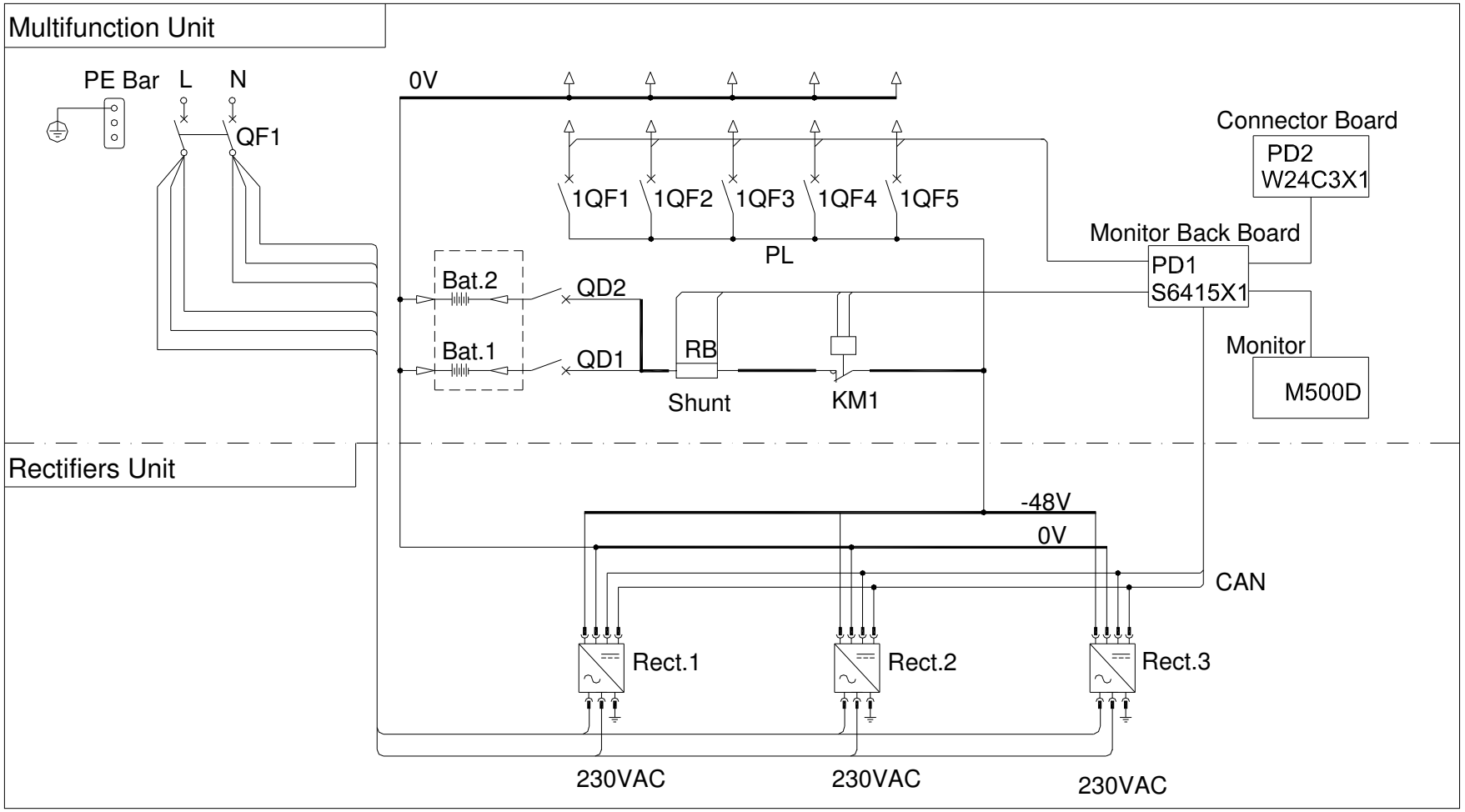
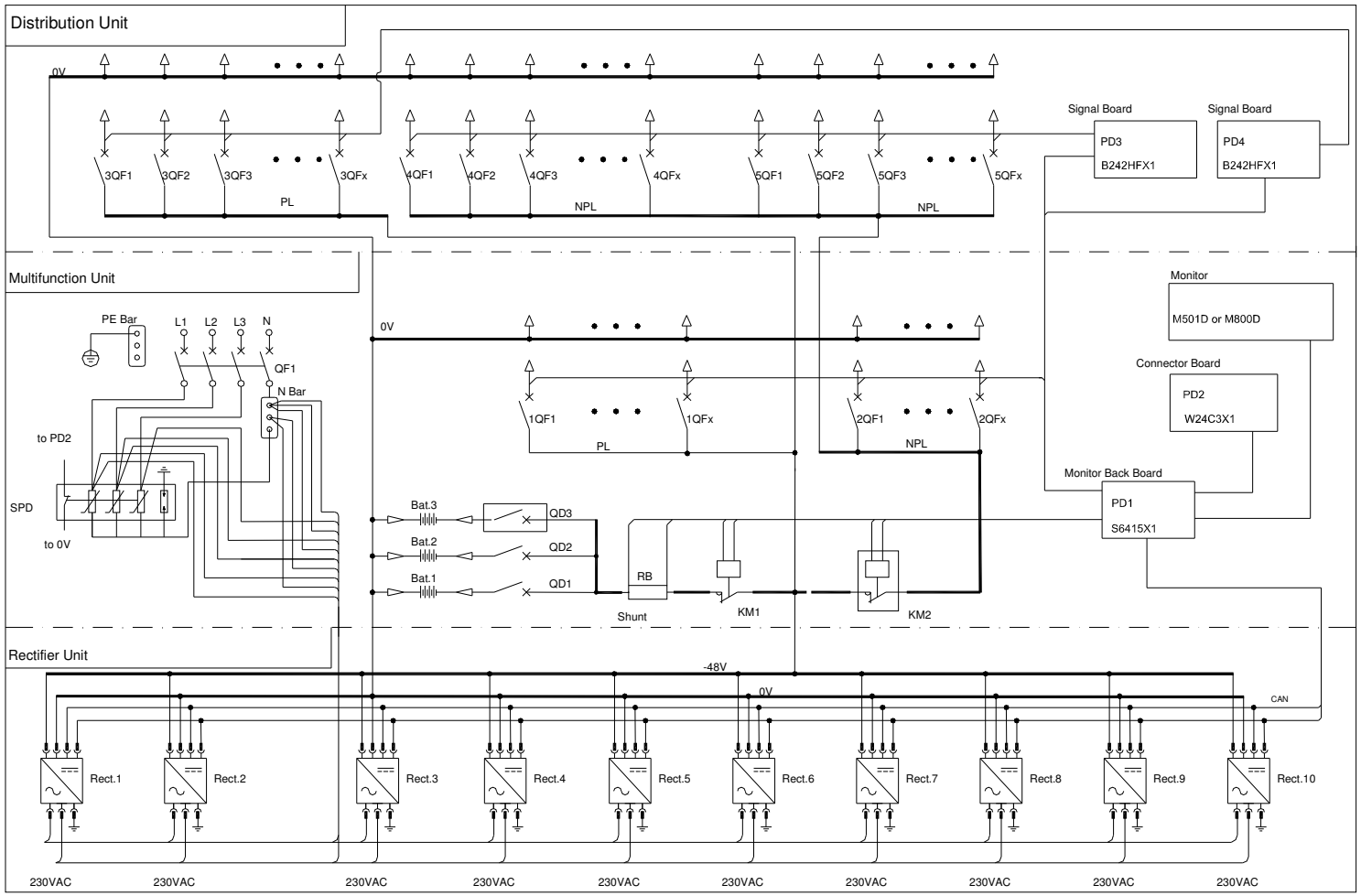


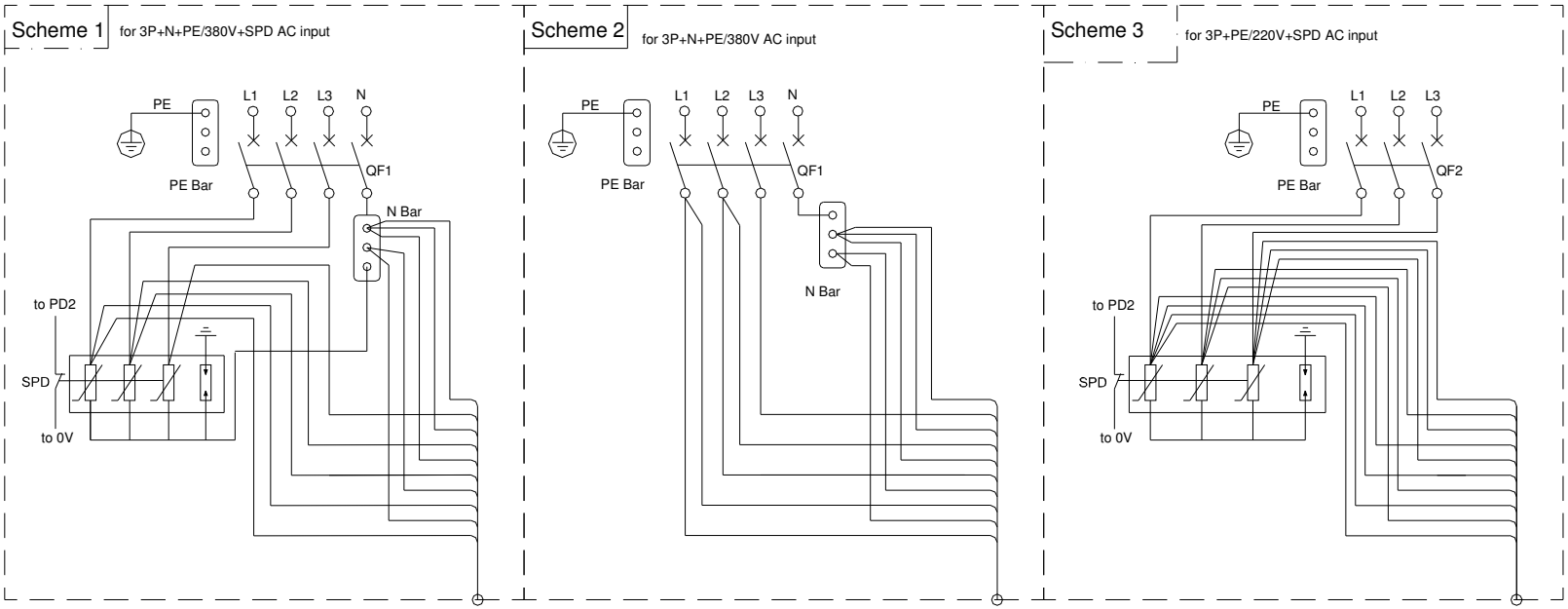
Figure 7 Schematic diagram of NetSure 701 A51 (PS48300-3A/3200-X2)



Note:

1. The AC distribution has 3 schemes, determined by user requirement. Refer to diagram (2).
2. The maximum output current of the MFU is 300A.
3. The number of the 1QFx and 2QFx in MFU is configurable. The total width of the load MCBs should be smaller than 190mm.
4. The DU is optional. The number of the 3QFx, 4QFx and 5QFx in MFU is configurable. The total width of the load MCBs should be smaller than the installation size.
5. The monitoring module can be M501D or M800D.
6. The number of the battery MCBs can be 2 or 3.
7. The LLVD contactor KM2 is configurable.

Figure 8 Schematic diagram of NetSure 501 AA0 (1)



Note:

1. The AC distribution has 3 schemes, determined by user requirement.

Figure 9 Schematic diagram of NetSure 501 AA0 (2)

Appendix 4 Glossary

Abbreviation	Full word
Amb.Temp	Ambient Temperature
Batt	Battery
BC	Boost Charging
BLVD	Battery Lower Voltage Disconnection
Cap	Capacity
CommMode	Communication Mode
CurrLimit	Current Limit
CycBC	Cyclic Boost Charging
Con Alarm Voice	Control Alarm Voice
Hist Alarm	Historical alarm
HVSD	High Voltage Shutdown
InitParam	Initialize Parameters
InitPWD	Initialize Password
LLVD	Load Low Voltage Disconnection
LVD	Low Voltage Disconnection
MCB	Miniature Circuit Breaker
Ph-A	Phase A
PWD	Password
Rect	Rectifier
Shunt coeff	Shunt Coefficient
SM	Supervision module (monitoring module)
SPD	Surge Protection Device
SW Version	Software Version
Sys	System
Temp	Temperature
Temp Comp	Temperature Compensation
Volt	Voltage